Date: 5 February 1999
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-BC Areas - Full Protocol - Waste Sites 116-B-11, 116-B-13, 116-B-14
Subject: Inorganics - Data Package No. W02614-QES (SDG No. W02614)

INTRODUCTION

This memo presents the results of data validation on Data Package No. W02614-QES prepared by Quanterra Environmental Services (QES). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID & Unit	Sample Date	Media	Validation	Analysis
B0T0B0 (116-B-11)	11/20/98	Soil	C	See note 1
B0T0B1 (116-B-11)	11/20/98	Soil	C	See note 1
B0T0B2 (116-B-11)	11/20/98	Soil	C	See note 1
B0T0B3 (116-B-11)	11/20/98	Soil	C	See note 1
B0T0B4 (116-B-11)	11/20/98	Soil	C	See note 1
B0T0D3 (116-B-13)	11/23/98	Soil	C	See note 1
B0T0D4 (116-B-13)	11/23/98	Soil	C	See note 1
B0T0D5 (116-B-13)	11/23/98	Soil	C	See note 1
B0T0F9 (116-B-14)	11/23/98	Soil	C	See note 1
B0T0H0 (116-B-14)	11/23/98	Soil	C	See note 1
B0T0H1 (116-B-14)	11/23/98	Soil	C	See note 1
B0T098 (116-B-11)	11/20/98	Soil	C	See note 1
B0T099 (116-B-11)	11/20/98	Soil	C	See note 1

1 - ICP metals (total chromium and lead); Mercury (7471); Chrome VI (7196)

Data validation was conducted in accordance with the BHI validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL May 1998). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding time for ICP metals, mercury and chrome VI were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Solid samples must be analyzed within six (6) months for ICP metals, 28 days for mercury and 30 days for chromium VI.

  All holding times were acceptable.

- **Blanks**

  Preparation Blanks

  At least one preparation blank, processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

  In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than

ten times the absolute value of the preparation blank, no qualification is necessary.

Chromium (total) and lead were detected in preparation blank. No action was taken since all samples effected (B0T0D5 (116-B-13) and B0T0H1 (116-B-14)) were equipment blanks and qualification with a "U" would mask the fact that analytes were detected.

All other preparation blank results were acceptable.

Equipment Blanks

Two equipment blanks (B0T0D5 (116-B-13) and B0T0H1 (116-B-14)) were submitted for analysis. Lead was detected above the IDL in sample B0T0D5 (116-B-13) and chromium VI, chromium (total), and lead were detected in sample B0T0H1 (116-B-14). Under the BHI statement of work, no qualification is required.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

All accuracy spike recovery results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results

are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ".

All laboratory duplicate recovery results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 100 Area Remedial Action Sampling and Analysis Plan target detection limits (TDLs) or the CRDL if no TDL was specified, to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific TDL or CRDL.

- **Completeness**

Data package No. W02614-QES (SDG No. W02614) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Chromium (total) and lead were detected in preparation blank. No action was taken since all samples affected (B0T0D5 (116-B-13) and B0T0H1 (116-B-14)) were equipment blanks and qualification with a "U" would mask the fact that analytes were detected.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Interoffice Memorandum 056910, Joan Kessner to Distribution, *Hexavalent Chromium Analytical Holding Time*, 4 March 1998.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with BHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: W02614	REVIEWER: TLI	DATE: 2/5/99	PAGE 1 OF 1
COMMENTS: No qualifiers assigned.			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

INORGANIC ANALYSIS, SOIL MATRIX, (MG/KG)

Project: BECHTEL-HANFORD																							
Laboratory: Quanterra																							
Case	SDG: W02614																						
Sample Number		B0T0B0		B0T0B1		B0T0B2		B0T0B3		B0T0B4		B0T0D3		B0T0D4		B0T0D5		B0T0F9		B0T0H0		B0T0H1	
Unit		116-B-11		116-B-11		116-B-11		116-B-11		116-B-11		116-B-13		116-B-13		116-B-13		116-B-14		116-B-14		116-B-14	
Location		C8 (DEEP)		C9 (DEEP)		D10 (DEEP)		D1 (DEEP)		D2 (DEEP)		A3 (SHALLOW)		A4 (SHALLOW)		A3 (SHALLOW)		A1 (SHALLOW)		A2 (SHALLOW)		A1 (SHALLOW)	
Remarks																Equip. Blank						Equip. Blank	
Sample Date		11/20/98		11/20/98		11/20/98		11/20/98		11/20/98		11/23/98		11/23/98		11/23/98		11/23/98		11/23/98		11/23/98	
Inorganics	TDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Chromium VI	0.1	0.52		2.03		1.25		1.29		0.262		0.03	U	0.03	U	0.03	U	0.17		0.03	U	0.04	
Chromium (Total)	0.5	117		276		154		449		113		3.1		5.7		0.08	U	29.5		14.2		0.26	
Lead	2	8.3		13		8.5		21.5		10.4		1.6		2.3		0.32		18		6.5		1.1	
Mercury	0.05	0.96		4.1		1.2		14.5		2.8		0.02	U	0.02	U	0.02	U	0.02		0.02		0.02	U

INORGANIC ANALYSIS, SOIL MATRIX, (MG/KG)

Project: BECHTEL-HANFORD																					
Laboratory: Quanterra																					
Case	SDG: W02614																				
Sample Number		B0T098		B0T099																	
Unit		116-B-11		116-B-11																	
Location		C7 (DEEP)		C7 (DEEP)																	
Remarks				Duplicate																	
Sample Date		11/20/98		11/20/98																	
Inorganics	TDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Chromium VI	0.1	1		0.13																	
Chromium (Total)	0.5	228		183																	
Lead	2	6.3		5.8																	
Mercury	0.05	1.1		1.1																	

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T0B0

Lab Name: QUANTERRA_MO Contract: 550.186

Lab Code: ITMO Case No.: SAS No.: SDG No.: W02614

Matrix (soil/water): SOIL Lab Sample ID: 19511-010

Level (low/med): LOW Date Received: 12/25/98

% Solids: 92.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	117			P
7439-92-1	Lead	8.3	B		P
7439-97-6	Mercury	0.96			CV

Color Before: Clarity Before: Texture:

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Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T0B1

Lab Name: QUANTERRA_MO_____ Contract: 550.186___
Lab Code: ITMO__ Case No.:_____ SAS No.:_____ SDG No.: W02614_____
Matrix (soil/water): SOIL_ Lab Sample ID: 19511-004
Level (low/med): LOW__ Date Received: 12/25/98
% Solids: _88.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	276			P
7439-92-1	Lead	13.0			P
7439-97-6	Mercury	4.1			CV

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T0B2

Lab Name: QUANTERRA_MO Contract: 550.186
Lab Code: ITMO Case No.: SAS No.: SDG No.: W02614
Matrix (soil/water): SOIL Lab Sample ID: 19511-005
Level (low/med): LOW Date Received: 12/25/98
% Solids: 89.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	154			P
7439-92-1	Lead	8.5	B		P
7439-97-6	Mercury	1.2			CV

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T0B3

Lab Name: QUANTERRA_MO_____ Contract: 550.186___
Lab Code: ITMO__ Case No.:_____ SAS No.:_____ SDG No.: W02614_____
Matrix (soil/water): SOIL_ Lab Sample ID: 19511-006
Level (low/med): LOW__ Date Received: 12/25/98
% Solids: _90.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	449			P
7439-92-1	Lead	21.5			P
7439-97-6	Mercury	14.5			CV

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T0B4

Lab Name: QUANTERRA_MO Contract: 550.186
Lab Code: ITMO Case No.: SAS No.: SDG No.: W02614
Matrix (soil/water): SOIL Lab Sample ID: 19511-007
Level (low/med): LOW Date Received: 12/25/98
% Solids: 92.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	113			P
7439-92-1	Lead	10.4	B		P
7439-97-6	Mercury	2.8			CV

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T0D3

Lab Name: QUANTERRA_MO Contract: 550.186

Lab Code: ITMO Case No.: SAS No.: SDG No.: W02614

Matrix (soil/water): SOIL Lab Sample ID: 19511-001

Level (low/med): LOW Date Received: 12/25/98

% Solids: 93.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	3.1			P
7439-92-1	Lead	1.6	B		P
7439-97-6	Mercury	0.02	U		CV

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EPA SAMPLE NO.

B0T0D4

Lab Name: QUANTERRA MO Contract: 550.186
Lab Code: ITMO Case No.: SAS No.: SDG No.: W02614
Matrix (soil/water): SOIL Lab Sample ID: 19511-002
Level (low/med): LOW Date Received: 12/25/98
% Solids: 94.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	5.7			P
7439-92-1	Lead	2.3	B		P
7439-97-6	Mercury	0.02	U		CV

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T0D5

Lab Name: QUANTERRA_MO_____ Contract: 550.186___

Lab Code: ITMO__ Case No.:_____ SAS No.:_____ SDG No.: W02614_____

Matrix (soil/water): SOIL_ Lab Sample ID: 19511-003

Level (low/med): LOW_ Date Received: 12/25/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	0.08	U		P
7439-92-1	Lead	0.32	B		P
7439-97-6	Mercury	0.02	U		CV

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T0F9

Lab Name: QUANTERRA MO Contract: 550.186
Lab Code: ITMO Case No.: SAS No.: SDG No.: W02614
Matrix (soil/water): SOIL Lab Sample ID: 19511-011
Level (low/med): LOW Date Received: 12/25/98
% Solids: 93.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	29.5			P
7439-92-1	Lead	18.0			P
7439-97-6	Mercury	0.02	B		CV

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T0H0

Lab Name: QUANTERRA_MO_____ Contract: 550.186___
Lab Code: ITMO__ Case No.:_____ SAS No.:_____ SDG No.: W02614_____
Matrix (soil/water): SOIL_ Lab Sample ID: 19511-012
Level (low/med): LOW__ Date Received: 12/25/98
% Solids: _94.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	14.2			P
7439-92-1	Lead	6.5	B		P
7439-97-6	Mercury	0.02	B		CV

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T0H1

Lab Name: QUANTERRA_MO_____ Contract: 550.186___
Lab Code: ITMO__ Case No.:_____ SAS No.:_____ SDG No.: W02614_____
Matrix (soil/water): SOIL_ Lab Sample ID: 19511-013
Level (low/med): LOW__ Date Received: 12/25/98
% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	0.26	B		P
7439-92-1	Lead	1.1	B		P
7439-97-6	Mercury	0.02	U		CV

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T098

Lab Name: QUANTERRA_MO_____ Contract: 550.186___
Lab Code: ITMO___ Case No.:_____ SAS No.:_____ SDG No.: W02614_____
Matrix (soil/water): SOIL_ Lab Sample ID: 19511-008
Level (low/med): LOW__ Date Received: 12/25/98
% Solids: _91.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium_	228			P
7439-92-1	Lead___	6.3	B		P
7439-97-6	Mercury__	1.1			CV

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0T099

Lab Name: QUANTERRA_MO Contract: 550.186

Lab Code: ITMO Case No.: SAS No.: SDG No.: W02614

Matrix (soil/water): SOIL Lab Sample ID: 19511-009

Level (low/med): LOW Date Received: 12/25/98

% Solids: 92.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-47-3	Chromium	183			P
7439-92-1	Lead	5.8	B		P
7439-97-6	Mercury	1.1			CV

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139510	**MATRIX:**	SOIL
CLIENT ID:	B0T0B0	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	5.20E-01		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~1.26E+00~~	~~J~~	~~2.1E-01~~	~~2.8E-01~~	~~2.35E-02~~	~~pCi/g~~	~~89.80%~~	~~RICHRC5080~~
U-234	8.09E-01	J	1.3E-01	1.9E-01	3.32E-02	pCi/g	82.30%	RICHRC5030
U-235	5.42E-02	J	3.5E-02	3.7E-02	2.79E-02	pCi/g	82.30%	RICHRC5030
U-238	7.71E-01	J	1.3E-01	1.8E-01	2.99E-02	pCi/g	82.30%	RICHRC5030
PU-238	8.67E-02		4.3E-02	4.5E-02	1.47E-02	pCi/g	58.80%	RICHRC5010
PU239/40	3.00E+00		2.5E-01	4.6E-01	2.89E-02	pCi/g	58.80%	RICHRC5010
AM-241	4.10E-02	U	1.5E-01	1.5E-01	2.52E-01	pCi/g	N/A	RICHRC5017
CO-60	4.43E+00		4.6E-01	4.6E-01	5.48E-02	pCi/g	N/A	RICHRC5017
CS-137	3.25E+01		3.3E+00	3.3E+00	9.24E-02	pCi/g	N/A	RICHRC5017
EU-152	3.06E+01		3.1E+00	3.1E+00	2.47E-01	pCi/g	N/A	RICHRC5017
EU-154	4.14E+00		4.9E-01	4.9E-01	1.91E-01	pCi/g	N/A	RICHRC5017
EU-155	2.23E-01	U	1.4E-01	1.4E-01	2.36E-01	pCi/g	N/A	RICHRC5017
U-238	1.64E-01	U	1.3E+00	1.3E+00	2.11E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	2.71E+00		2.0E-01	9.4E-01	1.37E-01	pCi/g	70.90%	RICHRC5006
NI-63	4.40E+02		7.8E+00	5.4E+01	5.36E+00	pCi/g	93.00%	RICHRC5069

Number of Results: 16

12/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result <

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Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02614 / 6731
LAB SAMPLE ID:	81139504	MATRIX:	SOIL
CLIENT ID:	B0T0B1	DATE RECEIVED:	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	2.03E+00		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~4.94E+00~~	~~J~~	~~3.7E-01~~	~~7.7E-01~~	~~1.88E-02~~	~~pCi/g~~	~~111.00%~~	~~RICHRC5080~~
U-234	1.24E+00		1.7E-01	2.7E-01	3.69E-02	pCi/g	76.90%	RICHRC5030
U-235	6.42E-02	J	4.0E-02	4.1E-02	2.97E-02	pCi/g	76.90%	RICHRC5030
U-238	1.24E+00		1.7E-01	2.7E-01	3.18E-02	pCi/g	76.90%	RICHRC5030
PU-238	6.26E-01		1.4E-01	1.7E-01	3.23E-02	pCi/g	40.20%	RICHRC5010
PU239/40	1.95E+01		7.9E-01	2.9E+00	3.23E-02	pCi/g	40.20%	RICHRC5010
AM-241	2.57E+00		5.2E-01	5.2E-01	5.02E-01	pCi/g	N/A	RICHRC5017
CO-60	3.49E+01		3.5E+00	3.5E+00	1.38E-01	pCi/g	N/A	RICHRC5017
CS-137	2.38E+02		2.4E+01	2.4E+01	2.69E-01	pCi/g	N/A	RICHRC5017
EU-152	3.20E+02		3.2E+01	3.2E+01	6.67E-01	pCi/g	N/A	RICHRC5017
EU-154	4.38E+01		4.5E+00	4.5E+00	5.30E-01	pCi/g	N/A	RICHRC5017
EU-155	1.71E+00		4.5E-01	4.5E-01	5.70E-01	pCi/g	N/A	RICHRC5017
U-238	-8.10E-01	U	2.6E+00	2.6E+00	4.20E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	6.82E+00		2.4E-01	2.1E+00	1.08E-01	pCi/g	63.00%	RICHRC5006
NI-63	2.70E+03		1.9E+01	3.1E+02	5.67E+00	pCi/g	87.90%	RICHRC5069

Number of Results: 16

2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result <

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139505	**MATRIX:**	SOIL
CLIENT ID:	B0T0B2	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	1.25E+00		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~1.36E+00~~	~~J~~	~~2.2E-01~~	~~3.1E-01~~	~~3.71E-02~~	~~pCi/g~~	~~81.60%~~	~~RICHRC5080~~
U-234	1.00E+00		1.4E-01	2.1E-01	2.93E-02	pCi/g	84.20%	RICHRC5030
U-235	3.38E-02	J	2.6E-02	2.7E-02	2.26E-02	pCi/g	84.20%	RICHRC5030
U-238	9.32E-01	J	1.4E-01	2.0E-01	3.06E-02	pCi/g	84.20%	RICHRC5030
PU-238	4.64E-02		3.8E-02	3.8E-02	2.09E-02	pCi/g	40.00%	RICHRC5010
PU239/40	4.05E+00		3.5E-01	6.7E-01	2.09E-02	pCi/g	40.00%	RICHRC5010
AM-241	4.48E-01		2.5E-01	2.5E-01	3.69E-01	pCi/g	N/A	RICHRC5017
CO-60	7.62E+00		7.8E-01	7.8E-01	6.21E-02	pCi/g	N/A	RICHRC5017
CS-137	8.58E+01		8.6E+00	8.6E+00	1.13E-01	pCi/g	N/A	RICHRC5017
EU-152	5.00E+01		5.0E+00	5.0E+00	2.99E-01	pCi/g	N/A	RICHRC5017
EU-154	6.84E+00		7.6E-01	7.6E-01	2.22E-01	pCi/g	N/A	RICHRC5017
EU-155	4.96E-01	U	2.2E-01	2.2E-01	2.61E-01	pCi/g	N/A	RICHRC5017
U-238	-2.02E-01	U	1.8E+00	1.8E+00	2.84E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	5.24E+00		2.2E-01	1.6E+00	1.26E-01	pCi/g	51.60%	RICHRC5006
NI-63	6.35E+02		9.4E+00	7.7E+01	5.46E+00	pCi/g	91.70%	RICHRC5069

Number of Results: 16

2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result <

~~0010~~

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139506	**MATRIX:**	SOIL
CLIENT ID:	B0T0B3	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	1.29E+00		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~1.42E+01~~		~~6.7E-01~~	~~2.2E+00~~	~~2.88E-02~~	~~pCi/g~~	~~97.90%~~	~~RICHRC5080~~
U-234	1.68E+00		1.9E-01	3.3E-01	3.02E-02	pCi/g	83.00%	RICHRC5030
U-235	4.93E-02	J	3.2E-02	3.3E-02	2.72E-02	pCi/g	83.00%	RICHRC5030
U-238	1.45E+00		1.7E-01	2.9E-01	2.72E-02	pCi/g	83.00%	RICHRC5030
PU-238	1.35E+00		2.4E-01	3.2E-01	2.95E-02	pCi/g	39.10%	RICHRC5010
PU239/40	5.13E+01		1.5E+00	8.3E+00	5.81E-02	pCi/g	39.10%	RICHRC5010
AM-241	4.92E+00		9.7E-01	9.7E-01	1.01E+00	pCi/g	N/A	RICHRC5017
CO-60	9.44E+01		9.5E+00	9.5E+00	2.38E-01	pCi/g	N/A	RICHRC5017
CS-137	1.41E+02		1.4E+01	1.4E+01	4.34E-01	pCi/g	N/A	RICHRC5017
EU-152	8.44E+02		8.4E+01	8.4E+01	9.64E-01	pCi/g	N/A	RICHRC5017
EU-154	1.04E+02		1.1E+01	1.1E+01	8.61E-01	pCi/g	N/A	RICHRC5017
EU-155	3.49E+00		8.1E-01	8.1E-01	1.06E+00	pCi/g	N/A	RICHRC5017
U-238	-2.52E+01	U	6.5E+00	6.5E+00	8.40E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	7.15E+00		2.4E-01	2.3E+00	1.06E-01	pCi/g	61.10%	RICHRC5006
NI-63	6.14E+03		3.0E+01	7.0E+02	5.92E+00	pCi/g	89.40%	RICHRC5060

Number of Results: 16

RLW 2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result <

~~0011~~

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139507	**MATRIX:**	SOIL
CLIENT ID:	B0T0B4	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	2.62E-01		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~2.69E+00~~	~~J~~	~~3.0E-01~~	~~5.0E-01~~	~~3.91E-02~~	~~pCi/g~~	~~95.80%~~	~~RICHRC5089~~
U-234	9.87E-01	J	1.4E-01	2.1E-01	3.03E-02	pCi/g	85.80%	RICHRC5030
U-235	4.29E-02	J	2.9E-02	3.0E-02	2.44E-02	pCi/g	85.80%	RICHRC5030
U-238	9.67E-01	J	1.4E-01	2.1E-01	3.15E-02	pCi/g	85.80%	RICHRC5030
PU-238	2.56E-01		8.9E-02	9.6E-02	2.10E-02	pCi/g	58.90%	RICHRC5010
PU239/40	1.05E+01		5.7E-01	1.6E+00	3.54E-02	pCi/g	58.90%	RICHRC5010
AM-241	4.61E-01	U	5.5E-01	5.5E-01	9.07E-01	pCi/g	N/A	RICHRC5017
CO-60	1.59E+01		1.6E+00	1.6E+00	7.53E-02	pCi/g	N/A	RICHRC5017
CS-137	3.54E+01		3.5E+00	3.5E+00	1.42E-01	pCi/g	N/A	RICHRC5017
EU-152	8.48E+01		8.5E+00	8.5E+00	3.27E-01	pCi/g	N/A	RICHRC5017
EU-154	1.06E+01		1.1E+00	1.1E+00	2.70E-01	pCi/g	N/A	RICHRC5017
EU-155	3.70E-01	U	2.8E-01	2.8E-01	3.95E-01	pCi/g	N/A	RICHRC5017
U-238	1.03E-01	U	3.5E+00	3.5E+00	5.81E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	2.07E+00		1.3E-01	6.3E-01	9.55E-02	pCi/g	66.50%	RICHRC5006
NI-63	2.02E+03		1.6E+01	2.3E+02	5.42E+00	pCi/g	91.80%	RICHRC5069

Number of Results: 16

2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139501	**MATRIX:**	SOIL
CLIENT ID:	B0T0D3	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~4.93E-01~~	~~J~~	~~1.5E-01~~	~~1.7E-01~~	~~3.18E-02~~	~~pCi/g~~	~~87.90%~~	~~RICHRC5080~~
U-234	8.44E-01	J	1.2E-01	1.7E-01	2.14E-02	pCi/g	96.20%	RICHRC5030
U-235	2.08E-02	J	1.9E-02	1.9E-02	1.96E-02	pCi/g	96.20%	RICHRC5030
U-238	7.46E-01	J	1.1E-01	1.6E-01	3.27E-02	pCi/g	96.20%	RICHRC5030
PU-238	0.00E+00	U	0.0E+00	1.7E-02	1.56E-02	pCi/g	53.40%	RICHRC5010
PU239/40	3.98E-02		3.0E-02	3.1E-02	2.32E-02	pCi/g	53.40%	RICHRC5010
AM-241	-2.43E-03	U	2.5E-02	2.5E-02	3.49E-02	pCi/g	N/A	RICHRC5017
CO-60	1.72E-02	U	2.3E-02	2.3E-02	4.13E-02	pCi/g	N/A	RICHRC5017
CS-137	1.99E-02	U	2.2E-02	2.2E-02	3.75E-02	pCi/g	N/A	RICHRC5017
EU-152	9.76E-02	U	9.1E-02	9.1E-02	8.92E-02	pCi/g	N/A	RICHRC5017
EU-154	-6.14E-02	U	7.4E-02	7.4E-02	1.20E-01	pCi/g	N/A	RICHRC5017
EU-155	1.87E-02	U	3.6E-02	3.6E-02	6.06E-02	pCi/g	N/A	RICHRC5017
U-238	7.85E-01		3.7E-01	3.7E-01	3.44E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	5.11E-03	U	3.5E-02	3.5E-02	1.09E-01	pCi/g	56.40%	RICHRC5006
NI-63	-1.08E-01	U	2.5E+00	7.4E+00	6.37E+00	pCi/g	80.50%	RICHRC5069

Number of Results: 16

2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result <

0006

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139502	**MATRIX:**	SOIL
CLIENT ID:	B0T0D4	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~3.52E-01~~	~~J~~	~~1.3E-01~~	~~1.4E-01~~	~~3.07E-02~~	~~pCi/g~~	~~98.80%~~	~~RICHRC50~~
U-234	1.07E+00		1.5E-01	2.3E-01	3.07E-02	pCi/g	76.00%	RICHRC50
U-235	3.50E-02	J	2.9E-02	2.9E-02	3.36E-02	pCi/g	76.00%	RICHRC50
U-238	9.19E-01	J	1.4E-01	2.1E-01	3.84E-02	pCi/g	76.00%	RICHRC50
PU-238	5.32E-03	U	1.1E-02	1.1E-02	1.44E-02	pCi/g	57.50%	RICHRC50
PU239/40	1.55E-02	U	1.8E-02	1.9E-02	2.14E-02	pCi/g	57.50%	RICHRC50
AM-241	1.87E-02	U	2.2E-02	2.2E-02	3.20E-02	pCi/g	N/A	RICHRC50
CO-60	1.72E-02	U	2.1E-02	2.1E-02	3.86E-02	pCi/g	N/A	RICHRC50
CS-137	1.98E-02	U	2.0E-02	2.0E-02	3.48E-02	pCi/g	N/A	RICHRC50
EU-152	1.38E-01	U	7.0E-02	7.0E-02	8.92E-02	pCi/g	N/A	RICHRC50
EU-154	-5.38E-03	U	6.5E-02	6.5E-02	1.11E-01	pCi/g	N/A	RICHRC50
EU-155	1.48E-02	U	3.3E-02	3.3E-02	5.50E-02	pCi/g	N/A	RICHRC50
U-238	6.08E-01		2.6E-01	2.6E-01	3.07E-01	pCi/g	N/A	RICHRC50
STRONTIUM	1.50E-02	U	3.5E-02	3.5E-02	1.07E-01	pCi/g	57.00%	RICHRC50
NI-63	4.56E-01	U	2.6E+00	7.4E+00	6.79E+00	pCi/g	80.70%	RICHRC50

Number of Results: 16

2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139503	**MATRIX:**	SOIL
CLIENT ID:	B0T0D5	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~2.50E-02~~	~~U~~	~~2.9E-02~~	~~2.9E-02~~	~~3.07E-02~~	~~pCi/g~~	~~90.00%~~	~~RICHRC5080~~
U-234	1.92E-01	J	5.6E-02	6.3E-02	1.87E-02	pCi/g	101.40%	RICHRC5030
U-235	1.57E-02	U	1.6E-02	1.7E-02	1.87E-02	pCi/g	101.40%	RICHRC5030
U-238	2.78E-01	J	6.8E-02	7.9E-02	1.65E-02	pCi/g	101.40%	RICHRC5030
PU-238	-4.31E-04	U	8.6E-04	8.6E-04	2.17E-02	pCi/g	56.40%	RICHRC5010
PU239/40	1.03E-02	U	1.5E-02	1.5E-02	2.16E-02	pCi/g	56.40%	RICHRC5010
AM-241	3.39E-02	U	3.3E-02	3.3E-02	5.62E-02	pCi/g	N/A	RICHRC5017
CO-60	2.06E-03	U	1.9E-02	1.9E-02	3.32E-02	pCi/g	N/A	RICHRC5017
CS-137	8.36E-03	U	1.6E-02	1.6E-02	2.89E-02	pCi/g	N/A	RICHRC5017
EU-152	-1.27E-02	U	4.0E-02	4.0E-02	6.46E-02	pCi/g	N/A	RICHRC5017
EU-154	-5.39E-03	U	5.4E-02	5.4E-02	9.43E-02	pCi/g	N/A	RICHRC5017
EU-155	-1.10E-03	U	2.8E-02	2.8E-02	4.82E-02	pCi/g	N/A	RICHRC5017
U-238	1.77E-01	U	5.2E-01	5.2E-01	4.85E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	9.34E-03	U	2.5E-02	2.5E-02	7.94E-02	pCi/g	86.90%	RICHRC5006
NI-63	2.36E+00	U	2.1E+00	6.1E+00	4.97E+00	pCi/g	102.70%	RICHRC5069

Number of Results: 16

2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139511	**MATRIX:**	SOIL
CLIENT ID:	B0T0F9	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	1.70E-01		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~1.60E-01~~	~~J~~	~~7.0E-02~~	~~7.4E-02~~	~~2.06E-02~~	~~pCi/g~~	~~102.70%~~	~~RICHRC5080~~
U-234	1.39E+00		2.1E-01	3.3E-01	4.29E-02	pCi/g	54.80%	RICHRC5030
U-235	3.68E-02	J	3.4E-02	3.5E-02	3.47E-02	pCi/g	54.80%	RICHRC5030
U-238	1.38E+00		2.0E-01	3.3E-01	4.88E-02	pCi/g	54.80%	RICHRC5030
PU-238	-1.34E-03	U	1.6E-03	1.6E-03	2.79E-02	pCi/g	59.80%	RICHRC5010
PU239/40	1.06E-01		4.9E-02	5.1E-02	1.52E-02	pCi/g	59.80%	RICHRC5010
AM-241	5.46E-02	U	4.9E-02	4.9E-02	7.25E-02	pCi/g	N/A	RICHRC5017
CO-60	1.62E-02	U	2.4E-02	2.4E-02	4.27E-02	pCi/g	N/A	RICHRC5017
CS-137	1.83E-01		4.1E-02	4.1E-02	3.75E-02	pCi/g	N/A	RICHRC5017
EU-152	1.32E+00		1.8E-01	1.8E-01	8.12E-02	pCi/g	N/A	RICHRC5017
EU-154	6.13E-02	U	7.5E-02	7.5E-02	1.32E-01	pCi/g	N/A	RICHRC5017
EU-155	4.26E-02	U	4.0E-02	4.0E-02	6.88E-02	pCi/g	N/A	RICHRC5017
U-238	1.09E+00		7.3E-01	7.3E-01	6.55E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	5.40E-01	J	9.6E-02	2.0E-01	1.40E-01	pCi/g	72.40%	RICHRC5006
NI-63	4.85E+00	U	2.4E+00	7.0E+00	5.52E+00	pCi/g	90.20%	RICHRC5069

Number of Results: 16

2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139512	**MATRIX:**	SOIL
CLIENT ID:	B0T0H0	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~1.75E-01~~	~~J~~	~~7.0E-02~~	~~7.4E-02~~	~~1.89E-02~~	~~pCi/g~~	~~111.80%~~	~~RICHRC5080~~
U-234	1.54E+00		2.2E-01	3.6E-01	3.46E-02	pCi/g	55.90%	RICHRC5030
U-235	2.03E-02	U	2.6E-02	2.7E-02	4.05E-02	pCi/g	55.90%	RICHRC5030
U-238	1.46E+00		2.1E-01	3.4E-01	4.29E-02	pCi/g	55.90%	RICHRC5030
PU-238	0.00E+00	U	0.0E+00	2.0E-02	1.77E-02	pCi/g	52.00%	RICHRC5010
PU239/40	3.22E-02		2.9E-02	3.0E-02	2.63E-02	pCi/g	52.00%	RICHRC5010
AM-241	5.87E-02	U	1.2E-01	1.2E-01	1.78E-01	pCi/g	N/A	RICHRC5017
CO-60	1.19E-02	U	3.8E-02	3.8E-02	6.68E-02	pCi/g	N/A	RICHRC5017
CS-137	1.08E-01		5.3E-02	5.3E-02	5.96E-02	pCi/g	N/A	RICHRC5017
EU-152	8.22E-01	U	1.8E-01	1.8E-01	1.97E-01	pCi/g	N/A	RICHRC5017
EU-154	-7.13E-02	U	1.1E-01	1.1E-01	1.87E-01	pCi/g	N/A	RICHRC5017
EU-155	9.63E-02	U	7.5E-02	7.5E-02	1.26E-01	pCi/g	N/A	RICHRC5017
U-238	4.92E+00		1.7E+00	1.7E+00	1.51E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	9.63E-02	U	5.3E-02	6.2E-02	1.38E-01	pCi/g	72.40%	RICHRC5006
NI-63	3.44E+00	U	2.4E+00	7.1E+00	5.71E+00	pCi/g	87.30%	RICHRC5069

Number of Results: 16

2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139513	**MATRIX:**	SOIL
CLIENT ID:	B0T0H1	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	4.00E-02		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~8.46E-02~~	~~J~~	~~5.3E-02~~	~~5.5E-02~~	~~2.29E-02~~	~~pCi/g~~	~~92.00%~~	~~RICHRC5080~~
U-234	1.97E-01	J	6.7E-02	7.5E-02	3.03E-02	pCi/g	74.10%	RICHRC5030
U-235	9.53E-03	U	1.6E-02	1.6E-02	3.03E-02	pCi/g	74.10%	RICHRC5030
U-238	2.19E-01	J	7.1E-02	8.0E-02	3.20E-02	pCi/g	74.10%	RICHRC5030
PU-238	-9.28E-04	U	1.3E-03	1.3E-03	2.65E-02	pCi/g	71.10%	RICHRC5010
PU239/40	4.87E-03	U	1.2E-02	1.2E-02	2.65E-02	pCi/g	71.10%	RICHRC5010
AM-241	-5.81E-03	U	5.5E-02	5.5E-02	9.30E-02	pCi/g	N/A	RICHRC5017
CO-60	-1.10E-02	U	1.8E-02	1.8E-02	3.05E-02	pCi/g	N/A	RICHRC5017
CS-137	-2.04E-03	U	1.6E-02	1.6E-02	2.65E-02	pCi/g	N/A	RICHRC5017
EU-152	-1.59E-02	U	3.6E-02	3.6E-02	6.07E-02	pCi/g	N/A	RICHRC5017
EU-154	-3.45E-02	U	5.7E-02	5.7E-02	9.51E-02	pCi/g	N/A	RICHRC5017
EU-155	1.91E-02	U	2.9E-02	2.9E-02	5.03E-02	pCi/g	N/A	RICHRC5017
U-238	1.74E-01	U	9.2E-01	9.2E-01	7.32E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	4.73E-02	U	3.7E-02	4.1E-02	1.11E-01	pCi/g	95.20%	RICHRC5006
NI-63	3.85E+00	U	2.1E+00	6.3E+00	4.97E+00	pCi/g	103.10%	RICHRC5069

Number of Results: 16

2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02614 / 6731
LAB SAMPLE ID:	81139508	MATRIX:	SOIL
CLIENT ID:	B0T098	DATE RECEIVED:	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	1.00E+00		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~8.95E-01~~	~~J~~	~~1.8E-01~~	~~2.3E-01~~	~~3.36E-02~~	~~pCi/g~~	~~89.20%~~	~~RICHRC5080~~
U-234	7.73E-01	J	1.2E-01	1.7E-01	2.34E-02	pCi/g	88.40%	RICHRC5030
U-235	1.61E-02	U	1.9E-02	1.9E-02	2.90E-02	pCi/g	88.40%	RICHRC5030
U-238	7.61E-01	J	1.2E-01	1.7E-01	3.32E-02	pCi/g	88.40%	RICHRC5030
PU-238	9.20E-02		4.3E-02	4.5E-02	1.38E-02	pCi/g	62.10%	RICHRC5010
PU239/40	2.33E+00		2.2E-01	3.6E-01	2.05E-02	pCi/g	62.10%	RICHRC5010
AM-241	2.60E-01		9.0E-02	9.0E-02	1.28E-01	pCi/g	N/A	RICHRC5017
CO-60	8.90E+00		9.1E-01	9.1E-01	7.95E-02	pCi/g	N/A	RICHRC5017
CS-137	1.04E+02		1.0E+01	1.0E+01	1.33E-01	pCi/g	N/A	RICHRC5017
EU-152	2.75E+01		2.8E+00	2.8E+00	4.17E-01	pCi/g	N/A	RICHRC5017
EU-154	4.37E+00		5.4E-01	5.4E-01	2.79E-01	pCi/g	N/A	RICHRC5017
EU-155	1.30E-01	U	1.5E-01	1.5E-01	2.55E-01	pCi/g	N/A	RICHRC5017
U-238	-5.74E-01	U	8.7E-01	8.7E-01	1.21E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	3.77E+00		2.3E-01	1.2E+00	1.38E-01	pCi/g	73.30%	RICHRC5006
NI-63	5.67E+02		9.2E+00	6.9E+01	5.75E+00	pCi/g	86.60%	RICHRC5069

Number of Results: 16

2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139509	**MATRIX:**	SOIL
CLIENT ID:	B0T099	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	1.30E-01		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
~~AM-241~~	~~7.28E-01~~	~~J~~	~~1.7E-01~~	~~2.0E-01~~	~~2.56E-02~~	~~pCi/g~~	~~86.50%~~	~~RICHRC5080~~
U-234	8.48E-01	J	1.3E-01	1.8E-01	2.18E-02	pCi/g	87.50%	RICHRC5030
U-235	4.22E-02	J	2.9E-02	2.9E-02	2.18E-02	pCi/g	87.50%	RICHRC5030
U-238	7.87E-01	J	1.2E-01	1.7E-01	1.92E-02	pCi/g	87.50%	RICHRC5030
PU-238	7.21E-02		4.2E-02	4.3E-02	2.78E-02	pCi/g	50.90%	RICHRC5010
PU239/40	2.51E+00		2.5E-01	4.1E-01	2.78E-02	pCi/g	50.90%	RICHRC5010
AM-241	4.23E-01	U	3.8E-01	3.8E-01	6.34E-01	pCi/g	N/A	RICHRC5017
CO-60	1.95E+01		2.0E+00	2.0E+00	1.09E-01	pCi/g	N/A	RICHRC5017
CS-137	1.61E+02		1.6E+01	1.6E+01	1.96E-01	pCi/g	N/A	RICHRC5017
EU-152	6.70E+01		6.8E+00	6.8E+00	5.20E-01	pCi/g	N/A	RICHRC5017
EU-154	1.06E+01		1.2E+00	1.2E+00	3.60E-01	pCi/g	N/A	RICHRC5017
EU-155	5.29E-01	U	2.5E-01	2.5E-01	4.13E-01	pCi/g	N/A	RICHRC5017
U-238	1.76E+00	U	3.0E+00	3.0E+00	4.73E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	3.89E+00		2.3E-01	1.3E+00	1.37E-01	pCi/g	74.70%	RICHRC5006
NI-63	4.37E+02		8.0E+00	5.4E+01	5.60E+00	pCi/g	89.90%	RICHRC5069

Number of Results: 16

2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result <

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

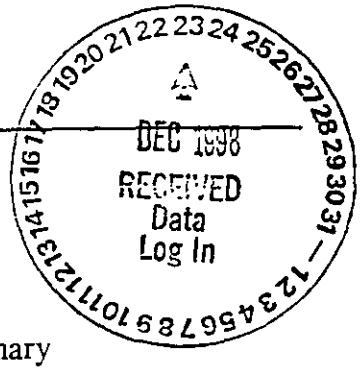
Quanterra

CERTIFICATE OF ANALYSIS

Bechtel Hanford, Inc.
3350 George Washington Way
Richland, WA 99352

December 23, 1998

Attention: Joan Kessner



SAF Number	:	B99-002
Date First Sample Received	:	November 24, 1998
Number of Samples	:	13
Sample Type	:	Soil
SDG Number	:	W02614
Data Deliverable	:	21 Day Priority / 28 Day Summary

I. Introduction

On November 24, 1998, the Quanterra Environmental Services Richland Laboratory (QESRL) received 13-priority soil samples for a 21-day priority radiochemical and chemical analysis. Upon receipt, the samples were assigned the following laboratory ID numbers to correspond with the Bechtel Hanford, Inc. (BHI) specific IDs:

QESRL ID#	BHI ID#	MATRIX	DATE OF RECEIPT
81139501	B0T0D3	Soil	11/24/98
81139502	B0T0D4	Soil	11/24/98
81139503	B0T0D5	Soil	11/24/98
81139504	B0T0B1	Soil	11/24/98
81139505	B0T0B2	Soil	11/24/98
81139506	B0T0B3	Soil	11/24/98
81139507	B0T0B4	Soil	11/24/98
81139508	B0T098	Soil	11/24/98
81139509	B0T099	Soil	11/24/98
81139510	B0T0B0	Soil	11/24/98
81139511	B0T0F9	Soil	11/24/98
81139512	B0T0H0	Soil	11/24/98
81139513	B0T0H1	Soil	11/24/98

0002

II. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information; analytical results and the appropriate associated statistical errors.

The requested analyses were:

Alpha Spectroscopy
Americium-241 by method RICH-RC-5080
Plutonium-238, -239/40 by method RICH-RC-5010
Uranium-234, -235, -238 by method RICH-RC-5030
Gamma Spectroscopy
Gamma Scan by method RICH-RC-5017
Gas Proportional Counting
Total Strontium by method RICH-RC-5006
Liquid Scintillation Counting
Nickel-63 by method RICH-RC-5069
Chemical Analyses
Chromium Hex by EPA method 7196

III. Quality Control

The analytical results for each analysis performed under SDG W02614 includes a minimum of two Laboratory Control Samples (LCS) and one method (reagent) blank. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results.

IV. Comments

Alpha Spectroscopy

Americium-241 by method RICH-RC-5080
The LCS, batch blank, sample duplicate (B0T0B4) and sample results are within contractual requirements. There was a matrix blank and spike analyzed with this sample batch and the results are within the contractual requirements.

Plutonium-238, -239/40 by method RICH-RC-5062
The LCS, batch blank, sample duplicate (B0T0B4) and sample results are within contractual requirements. There was a matrix blank and spike analyzed with this sample batch and the results are within the contractual requirements.

Uranium-234, -235, -238 by method RICH-RC-5030
The LCS, batch blank, sample duplicate (B0T0B4) and sample results are within contractual requirements. Samples B0T0D5, B0T0B1, B0T0B4, B0T098, B0T099 and B0T0B0 had Pu-239 peaks present in the uranium spectrum. The presence of the Pu-239 peak did not interfere with the uranium results.

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017
The LCS, batch blank, sample duplicate (B0T0D3) and sample results are within contractual requirements.

Gas Proportional Counting

Total Strontium by method RICH-RC-5006
The LCS, batch blank, sample duplicate (B0T0H1) and sample results are within contractual requirements.

Liquid Scintillation Counting

Nickel-63 by method RICH-RC-5069
The LCS, sample duplicate (B0T0B4), matrix spike (B0T0B4), batch blank and sample results are within contractual requirements.

Chemical Analyses

Chromium Hex by EPA method 7196
The LCS, sample duplicate (B0T0H1), batch blank, matrix spike (B0T0H1) and sample results are within contractual requirements.

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

for Andy Kopriva
Project Manager

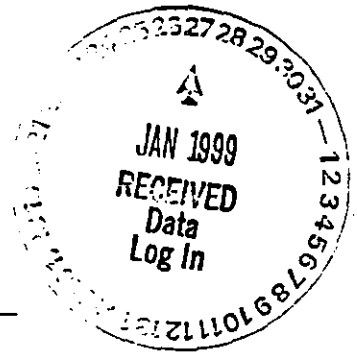
Quanterra Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CASE NARRATIVE

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352



January 26, 1999

Attention: Joan Kessner

Project Number	:	550.186
SDG	:	W02614
Number of Samples	:	Thirteen
Sample Matrix	:	Soil
Data Deliverable	:	Summary
Date SDG Closed	:	November 24, 1998

II. Introduction

On November 24, 1998, a total of thirteen "soil" samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. There were no comments or nonconformances associated with the shipping or receiving of the samples. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

St. Louis ID	BHI ID	SAF ID	Matrix	Date of Receipt
19511-001	B0T0D3	B99-002	SOIL	24-NOV-98
19511-002	B0T0D4	B99-002	SOIL	24-NOV-98
19511-003	B0T0D5	B99-002	SOIL	24-NOV-98
19511-004	B0T0B1	B99-002	SOIL	24-NOV-98
19511-005	B0T0B2	B99-002	SOIL	24-NOV-98
19511-006	B0T0B3	B99-002	SOIL	24-NOV-98
19511-007	B0T0B4	B99-002	SOIL	24-NOV-98
19511-008	B0T098	B99-002	SOIL	24-NOV-98
19511-009	B0T099	B99-002	SOIL	24-NOV-98
19511-010	B0T0B0	B99-002	SOIL	24-NOV-98
19511-011	B0T0F9	B99-002	SOIL	24-NOV-98
19511-012	B0T0H0	B99-002	SOIL	24-NOV-98
19511-013	B0T0H1	B99-002	SOIL	24-NOV-98

III. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

Analyses requested:	ICP Metals (Chromium and Lead) by EPA method 6010A. Mercury by EPA method 7471
Deviation from Request:	No Deviation from requested methods.

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike
MS- Matrix Spike.
MSD- Matrix Spike Duplicate.

V. Comments

General: There are no general comments.

Inorganics: A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

There were no metals comments for this sample delivery group.

I certify that this Summary Package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Shiela Louvier
Shiela M. Louvier
St. Louis Project Manager

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-002-12	Page 1 of 1

Collector Coffman/Fahlberg	**Company Contact** R Coffman **Telephone No.** 373-6425	**Project Coordinator** TRENT, SJ	**Price Code** R.E 11-23-98 **Data Turnaround** 15 Days 21 Day
Project Designation 100 BC Areas - Full Protocol	**Sampling Location** 116-B-13	**SAF No.** B99-002	
Ice Chest No. SML 314	**Field Logbook No.** EL 1327-1	**Method of Shipment**	
Shipped To Quanterra Incorporated	**Offsite Property No.**	**Bill of Lading/Air Bill No.**	
		COA	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool 4C	None	None	None	None	None	None	None	None	None
Type of Container	aG	aG	aG	aG	aG	aG	P	aG	aG	Marinelli
No. of Container(s)	0	0	1	0	0	0	1	1	1	1
Volume	60mL	60mL	60mL	60mL	60mL	60mL	20mL	60mL	60mL	500mL

SAMPLE ANALYSIS 811394 SDG W026014

				Chromium Hex - 7196 811395	ICP Metals - 6010A (Add-on) (Lead)	ICP Metals - 6010A (SW-846) (Chromium, Lead)	Mercury - 7471 - (CV)	Nickel-63 811395	Strontium-89,90 -- Total Sr	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium 811395	ICP Metals - 6010A (TAL)	See item (1) in Special Instructions 811395
Sample No.		Matrix *	Sample Date	Sample Time									
B0T0D3	01	Soil	11-23-98	1420	X		X	X	X	X	X	X		X
B0T0D4	02	Soil	11-23-98	1430	X		X	X	X	X	X	X		X
B0T0D5	03	Soil	11-23-98	1415	X		X	X	X	X	X	X		X

0000046

CHAIN OF POSSESSION — **Sign/Print Names**

	Date/Time		Date/Time
Relinquished By Doug Barnes Doug Barnes	11-24-98/1300	Received By	11-24-98 1300
Relinquished By	Date/Time	Received By L100Cpy	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

** The ERC contractor acknowleges the 24-hour holding time is not likely achievable for Hex Chrom by EPA 7196.

** Use a separate Chain of Custody for each waste site.

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

B0T0D3 = B0T140
B0T0D4 = B0T146

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

1500

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-002-05	Page 1 of 1

Collector	Company Contact	Telephone No.	Project Coordinator	Data Turnaround
Coffman/Fahlberg	R Coffman	373-6425	TRENT, SJ	~~15 Days~~ 21 DAYS
Project Designation	**Sampling Location**		**SAF No.**	
100 BC Areas - Full Protocol	116-B-11		B99-002	
Ice Chest No. SML 314	**Field Logbook No.** EL 1327-1		**Method of Shipment**	
Shipped To Quanterra Incorporated	**Offsite Property No.**		**Bill of Lading/Air Bill No.**	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool 4C	None	None	None	None	None	None	None	None	None	None
Type of Container	aG	aG	aG	aG	aG	aG	P	aG	aG	Marinelli
No. of Container(s)	0	0	~~0~~ 1	0	0	0	1	1	1	1
Volume	60mL	60mL	60mL	60mL	60mL	60mL	20mL	60mL	60mL	500mL

SAMPLE ANALYSIS 811394

				Chromium Hex - 7196 811395	ICP Metals - 6010A (Add-on) (Lead)	ICP Metals - 6010A (SW-846) (Chromium, Lead)	Mercury - 7471 - (CV)	Nickel-63 811395	Strontium-89,90 -- Total Sr	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium 811395	ICP Metals - 6010A (TAL)	See item (1) Special Instructions 811395
Sample No		Matrix *	Sample Date	Sample Time									
B0T0B1	04	Soil	11/20/98	1345	X		X	X	X	X	X	X		X
B0T0B2	05	Soil	11/20/98	1330	X		X	X	X	X	X	X		X
B0T0B3	06	Soil	11/20/98	1300	X		X	X	X	X	X	T		X
B0T0B4	07	soil	11/20/98	1230	X		X	X	X	X	X	X		X

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	11-24-98/1305		1200 11-24-98
Relinquished By	Date/Time	Received By	Date/Time
		2100 pm	
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

** The ERC contractor acknowleges the 24-hour holding time is not likely achievable for Hex Chrom by EPA 7196.

** Use a separate Chain of Custody for each waste site.

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

Matrix *

S	=	Soil
SE	=	Sediment
SO	=	Solid
SL	=	Sludge
W	=	Water
O	=	Oil
A	=	Air
DS	=	Drum Solids
DL	=	Drum Liquids
T	=	Tissue
WI	=	Wipe
L	=	Liquid
V	=	Vegetation
X	=	Other

LABORATORY SECTION Received By ____ Title ____ Date/Time ____

FINAL SAMPLE DISPOSITION Disposal Method ____ Disposed By ____ Date/Time ____

8 SAF

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-002-04	Page 1 of 1

Collector	Company Contact	Telephone No.	Project Coordinator	Data Turnaround
Coffman/Fahlberg	R Coffman	373-6425	TRENT, SJ	~~15 Days~~ 21 DAYS
Project Designation	**Sampling Location**		**SAF No.**	
100 BC Areas - Full Protocol	116-B-11		B99-002	
Ice Chest No.	**Field Logbook No.**		**Method of Shipment**	
SML 314	EL 1327-1			
Shipped To	**Offsite Property No.**		**Bill of Lading/Air Bill No.**	
Quanterra Incorporated				

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool 4C	None	None	None	None	None	None	None	None	None	None
Type of Container	aG	aG	aG	aG	aG	aG	P	aG	aG	Marinelli
No. of Container(s)	0	0	Ref 0 1 Wet 1	0	0	0	1	1	1	1
Volume	60mL	60mL	60mL	60mL	60mL	60mL	20mL	60mL	60mL	500mL
SAMPLE ANALYSIS 811394	Chromium Hex - 7196 811395	ICP Metals - 6010A (Add-on) (Lead)	ICP Metals - 6010A (SW-846) (Chromium, Lead)	Mercury - 7471 - (CV)	Nickel-63 811	Strontium-89,90 -- Total Sr 395	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium 811395	ICP Metals - 6010A (TAL)	See item (1) in Special Instructions 811395

Sample No.	Matrix *	Sample Date	Sample Time									
B0T098 08	Soil	11/20/98	0810	X		X	X	X	X	X	X	X
B0T099 09	Soil	11/20/98	0810	X		X	X	X	X	X	X	X
B0T0B0 10	Soil	11/20/98	1350	X		X	X	X	X	X	X	X

0010048

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	11-24-98/1300	Heidelberg	11-24-98 1120
Relinquished By	Date/Time	Received By	Date/Time
		2 100cpy	
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

** The ERC contractor acknowleges the 24-hour holding time is not likely achievable for Hex Chrom by EPA 7196.

** Use a separate Chain of Custody for each waste site.

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

B0T098 = B0T0H9 B0T0B0 = B0T0H1
B0T099 B0T0H9

Matrix *

S	=	Soil
SE	=	Sediment
SO	=	Solid
SL	=	Sludge
W	=	Water
O	=	Oil
A	=	Air
DS	=	Drum Solids
DL	=	Drum Liquids
T	=	Tissue
WI	=	Wipe
L	=	Liquid
V	=	Vegetation
X	=	Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

0010048

Bechtel Hanford Inc. | **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** | B99-002-17

Collector: Coffman/Fahlberg	Company Contact: R Coffman — Telephone No.: 373-6425	Project Coordinator: TRENT, SJ	Price Code — Data Turnaround: R.f. 11.23.98 ~~15 Days~~ 21 Days
Project Designation: 100 BC Areas - Full Protocol	Sampling Location: 116-B-14	SAF No.: B99-002	
Ice Chest No.: SML 314	Field Logbook No.: EL 1327-1	Method of Shipment	
Shipped To: Quanterra Incorporated	Offsite Property No.	Bill of Lading/Air Bill No.	
		COA	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

SAMPLE ANALYSIS 811394

Sample No.	Matrix *	Sample Date	Sample Time	Preservation	Type of Container	No. of Container(s) / Volume	Chromium Hex - 7196	ICP Metals - 6010A (Add-on) (Lead)	ICP Metals - 6010A (SW-846) (Chromium, Lead)	Mercury - 7471 - (CV)	Nickel-63	Strontium-89,90 -- Total Sr	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium	ICP Metals - 6010A (TAL)	See item (1) in Special Instructions
				Cool 4C	aG	0 / 60mL	811395	None	None	None	None	None	None	None	None	None
				None	aG	0 / 60mL		None	None	None						
				None	aG	0 / 60mL		None	None	None						
				None	aG	0 / 60mL		None	None	None						
				None	aG	0 / 60mL		None	None	None	811	395				
				None	aG	0 / 60mL		None	None	None						
				None	P	1 / 20mL		None	None	None						
				None	aG	1 / 60mL		None	None	None						
				None	aG	1 / 60mL		None	None	None						
				None	Marinelli	1 / 500mL		None	None	None						
B0T0F9	11	Soil	11.23.98	1400			X		X	X	X	X	X	X		X
B0T0H0	12	Soil	11.23.98	1415			X		X	X	X	X	X	X		X
B0T0H1	RE. 11.23.98	Soil														11.24 RS X
B0T0H1	13	Soil	11.23.98	1400			X		X	X	X	X	X	X		X

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	11-24-98/1300	Fahlberg	11-24-98 1300
		2100 CP	

SPECIAL INSTRUCTIONS

** The ERC contractor acknowleges the 24-hour holding time is not likely achievable for Hex Chrom by EPA 7196.

** Use a separate Chain of Custody for each waste site.

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

B0T0F9 = B0T1R9

B0T0H0 = B0T1T2

Matrix *

Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 100-BC WS 116-8-11/13/14			DATA PACKAGE: W02614		
VALIDATOR: TLJ		LAB: QES		DATE: 2/1/99	
CASE:			SDG: W02614		
ANALYSES PERFORMED					
☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☐ SW-846/ICP	☐ SW-846/GFAA	☒ SW-846/Hg	☐ SW-846 Cyanide	VI OR VI	☐
SAMPLES/MATRIX					
B0T0B0, B0T0B1, B0T0B2, B0T0B3, B0T0B4					
B0T0D4, B0T0D5, ~~B0T0F6~~ B0T0D3, B0T0F9					
B0T0H0, B0T0H1, B0T098, B0T099					
Soil					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

A-19

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments? . . . . Yes No (N/A)

Are initial calibrations acceptable? . . . . Yes No (N/A)

Are ICP interference checks acceptable? . . . . Yes No (N/A)

Were ICV and CCV checks performed on all instruments? . . . . . Yes No (N/A)

Are ICV and CCV checks acceptable? . . . . Yes No (N/A)

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses? Yes No (N/A)

Are ICB and CCB results acceptable? . . . . Yes No (N/A)

Were preparation blanks analyzed? . . . . (Yes) No N/A

Are preparation blank results acceptable? . . . . Yes (No) N/A

Were field/trip blanks analyzed? . . . . (Yes) No N/A

Are field/trip blank results acceptable? . . . . Yes (No) N/A

Comments: ~~EB~~ Chromium (total) + lead → BOTO DS + OH1 ~~[illegible]~~ (
— 0.132 ~~.228~~ ~~[illegible]~~ 0.228
H1 ~~(Both equipment)~~
→ only equipment blanks affected — No qualifiers
DS + H1 EBs → lead detected in DS + lead + Chromium (total) in ~~DS~~ + H1
CR VI in H1 also

5. ACCURACY

Were spike samples analyzed? . . . . (Yes) No N/A

Are spike sample recoveries acceptable? . . . . (Yes) No N/A

Were laboratory control samples (LCS) analyzed? . . . . Yes No (N/A)

Are LCS recoveries acceptable? . . . . Yes No (N/A)

Comments:

Date: 5 February 1999
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-BC Areas - Full Protocol - Waste Sites 116-B-11, 116-B-13, 116-B-14
Subject: Radiochemistry - Data Package No. W02614-QES (SDG No. W02614)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. W02614-QES which was prepared by Quanterra Environmental Services (QES). A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID & Unit	Sample Date	Media	Validation	Analysis
B0T0B0 (116-B-11)	11/20/98	Soil	C	See note 1
B0T0B1 (116-B-11)	11/20/98	Soil	C	See note 1
B0T0B2 (116-B-11)	11/20/98	Soil	C	See note 1
B0T0B3 (116-B-11)	11/20/98	Soil	C	See note 1
B0T0B4 (116-B-11)	11/20/98	Soil	C	See note 1
B0T0D3 (116-B-13)	11/23/98	Soil	C	See note 1
B0T0D4 (116-B-13)	11/23/98	Soil	C	See note 1
B0T0D5 (116-B-13)	11/23/98	Soil	C	See note 1
B0T0F9 (116-B-14)	11/23/98	Soil	C	See note 1
B0T0H0 (116-B-14)	11/23/98	Soil	C	See note 1
B0T0H1 (116-B-14)	11/23/98	Soil	C	See note 1
B0T098 (116-B-11)	11/20/98	Soil	C	See note 1
B0T099 (116-B-11)	11/20/98	Soil	C	See note 1

1 - Gamma spectroscopy; alpha spectroscopy; nickel-63; strontium-90.

Data validation was conducted in accordance with the BHI validation statement of work (BHI 1997) and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL 1998). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months.

  All holding times were acceptable.

- **Blanks**

  Laboratory Blanks

  Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are elevated to the MDA and qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

  All blank results were acceptable.

  Equipment Blanks

  Two equipment blanks (B0TOD5 (116-B-13) and B0T0H1 (116-B-14)) were submitted for analysis. Uranium-234 and uranium-238 (alpha spectroscopy) were detected in sample B0TOD5 (116-B-13) and americium-241, uranium-234 and uranium-238 (alpha spectroscopy) were detected in in sample B0T0H1 (116-B-14). Under the BHI statement of work, no qualification is required.

- **Accuracy**

Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample and matrix spike recovery range is either 3 sigma or 70-130%. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

Due to a matrix spike recovery of 500%, all detected nickel-63 results (B0T0B0 (116-B-11), B0T0B1 (116-B-11), B0T0B2 (116-B-11), B0T0B3 (116-B-11), B0T0B4 (116-B-11), B0T098 (116-B-11), B0T099 (116-B-11)) were qualified as estimates and flagged "J".

Due to the lack of an LCS, all plutonium-238 results were qualified as estimates and flagged "J".

Due to a radiochemcal tracer yields of 111%, americium-241 (alpha spectroscopy) results in samples B0T0B1 (116-B-11) and B0T0H1 (116-B-14) were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than or equal to +/- 30 percent, the results are acceptable. If either activities are less then five times the CRDL, a control limit (acceptable RPD) of less than or equal to two times the CRDL is used. If either the original or replicate value is below the CRDL, the applicable control limits (acceptable RPD) are less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit (acceptable RPD), associated results are qualified as estimated detects or estimated non-detects.

Due to an RPD of 36%, all uranium-238 (GEA) results were qualified as estimates and flagged "J".

All other duplicate results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples (samples B0T098/B0T099 (116-B-11)) were submitted to QES for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. The following samples and anlaytes had RPDs outside QC limits (+/- 30%): Americium-241 (GEA) (48%); cobalt-60 (75%); cesium-137 (43%); europium-152 (83%); europium-154 (83%); europium-155 (121%). Although the above data is an indication of a problem with the GEA analysis, under the BHI statement of work, no qualification is required. All other field duplicate results were acceptable.

- **Detection Levels**

Reported analytical detection levels are compared against the 100 Area Remedial Action Sampling and Analysis Plan target detection limits (TDLs) or the contract specified MDA if no TDL was specified, to ensure that laboratory detection levels meet the required criteria. The following analytes and samples had reported MDAs above the TDL/MDA: Europium-155 in sample B0T0B4 (116-B-11) and uranium-238 in samples B0T0B0 (116-B-11), B0T0B4 (116-B-11), B0T0D5 (116-B-13), and B0T0H1 (116-B-14). All other reported laboratory MDAs were at or below the analyte-specific TDL or contract specified MDA.

- **Completeness**

Data Package No. W02614-QES was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to an RPD of 36%, all uranium-238 (GEA) results were qualified as estimates and flagged "J". Due to a radiochemcal tracer yields of 111%, americium-241 (alpha spectroscopy) results in samples B0T0B1 and B0T0H1 were qualified as estimates and flagged "J". Due to the lack of an LCS, all plutonium-238 results were qualified as estimates and flagged "J". Due to a matrix spike recovery of 500%, all detected nickel-63 results (B0T0B0, B0T0B1, B0T0B2, B0T0B3, B0T0B4, B0T098, B0T099) were qualified as estimates and flagged "J". The

following analytes and samples had reported MDAs above the TDL/MDA: Europium-155 in sample B0T0B4 (116-B-11) and uranium-238 in samples B0T0B0 (116-B-11), B0T0B4 (116-B-11), B0T0D5 (116-B-13), and B0T0H1 (116-B-14). Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Interoffice Memorandum 056910, Joan Kessner to Distribution, *Hexavalent Chromium Analytical Holding Time*, 4 March 1998.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the BHI statement of work are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: W02614	REVIEWER: TLI	DATE: 2/5/99	PAGE 1 OF 1
COMMENTS: No qualifiers assigned.			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Nickel-63	J	B0T0B0 (116-B-11) B0T0B1 (116-B-11) B0T0B2 (116-B-11) B0T0B3 (116-B-11) B0T0B4 (116-B-11) B0T098 (116-B-11) B0T099 (116-B-11)	MS recovery
Plutonium-238	J	All	No LCS
Americium-241 (alpha spectroscopy)	J	B0T0B1 (116-B-11) B0T0H1 (116-B-14)	Tracer yield
Uranium-238 (GEA)	J	All	RPD

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: BECHTEL-HANFORD																					
Laboratory: Quanterra																					
Case	SDG: W02614																				
Sample Number		B0T0B0		B0T0B1		B0T0B2		B0T0B3		B0T0B4		B0T0D3		B0T0D4		B0T0D5		B0T0F9		B0T0H0	
Unit		116-B-11		116-B-11		116-B-11		116-B-11		116-B-11		116-B-13		116-B-13		116-B-13		116-B-14		116-B-14	
Location		C8 (DEEP)		C9 (DEEP)		D10 (DEEP)		D1 (DEEP)		D2 (DEEP)		A3 (SHALLOW)		A4 (SHALLOW)		A3 (SHALLOW)		A1 (SHALLOW)		A2 (SHALLOW)	
Remarks																Equip. Blank					
Sample Date		11/20/98		11/20/98		11/20/98		11/20/98		11/20/98		11/23/98		11/23/98		11/23/98		11/23/98		11/23/98	
Radiochemistry	TDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Americium-241	0.1	1.26		4.94	J	1.36		14.2		2.69		0.493		0.352		0.025	U	0.16		0.175	
Uranium-234	0.1	0.809		1.24		1		1.68		0.987		0.844		1.07		0.192		1.39		1.54	
Uranium-235	0.1	0.0547		0.0642		0.0338		0.0493		0.0429		0.0208		0.035		0.0157	U	0.0368		0.0203	U
Uranium-238	0.1	0.771		1.24		0.932		1.45		0.967		0.746		0.919		0.278		1.38		1.46	
Plutonium-238	0.1	0.0867	J	0.626	J	0.0464	J	1.35	J	0.256	J	0	UJ	0.00532	UJ	-0.000431	UJ	-0.00134	UJ	0	UJ
Plutonium-239/240	0.1	3		19.5		4.05		51.3		10.5		0.0398		0.0155	U	0.0103	U	0.106		0.0322	
Americium-241 (GEA)	0.1	0.041	U	2.57		0.448		4.92		0.461	U	-0.00243	U	0.0187	U	0.0339	U	0.0546	U	0.0587	U
Cobalt-60	0.05	4.43		34.9		7.62		94.4		15.9		0.0172	U	0.0172	U	0.00206	U	0.0162	U	0.0119	U
Cesium-137DA	0.05	32.5		238		85.8		141		35.4		0.0199	U	0.0198	U	0.00836	U	0.183		0.108	
Europium-152	0.1	30.6		320		50		844		84.8		0.0976		0.138		-0.0127	U	1.32		0.822	
Europium-154	0.1	4.14		43.8		6.84		104		10.6		-0.0614	U	-0.00538	U	-0.00539	U	0.0613	U	-0.0713	U
Europium-155	0.05	0.223	U	1.71		0.496		3.49		0.37	U	0.0187	U	0.0148	U	-0.0011	U	0.0426	U	0.0963	U
Uranium-238(GEA)	0.1	0.164	UJ	-0.81	UJ	-0.202	UJ	-25.2	UJ	0.103	UJ	0.785	J	0.608	J	0.177	UJ	1.09	J	4.92	J
Strontium	1	2.71		6.82		5.24		7.15		2.07		0.00511	U	0.015	U	0.00934	U	0.54		0.0963	U
Nickel-63	30	440	J	2700	J	635	J	6140	J	2020	J	-0.108	U	0.456	U	2.36	U	4.85	U	3.44	U

E0000

Project: BECHTEL-HANFORD																			
Laboratory: Quanterra																			
Case	SDG: W02614																		
Sample Number		B0T0H1		B0T098		B0T099													
Unit		116-B-14		116-B-11		116-B-11													
Location		A1 (SHALLOW)		C7 (DEEP)		C7 (DEEP)													
Remarks		Equip. Blank				Duplicate													
Sample Date		11/23/98		11/20/98		11/20/98													
Radiochemistry	TDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Americium-241	0.1	0.0846	J	0.895		0.728													
Uranium-234	0.1	0.197		0.773		0.848													
Uranium-235	0.1	0.00953	U	0.0161	U	0.0422													
Uranium-238	0.1	0.219		0.761		0.787													
Plutonium-238	0.1	-0.000928	UJ	0.092	J	0.0721	J												
Plutonium-239/240	0.1	0.00487	U	2.33		2.51													
Americium-241 (GEA)	0.1	-0.00581	U	0.26		0.423	U												
Cobalt-60	0.05	-0.011	U	8.9		19.5													
Cesium-137DA	0.05	-0.00204	U	104		161													
Europium-152	0.1	-0.0159	U	27.5		67													
Europium-154	0.1	-0.0345	U	4.37		10.6													
Europium-155	0.05	0.0191	U	0.13	U	0.529	U												
Uranium-238(GEA)	0.1	0.174	UJ	-0.574	UJ	1.76	UJ												
Strontium	1	0.0473	U	3.77		3.89													
Nickel-63	30	3.85	U	567	J	437	J												

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139510	**MATRIX:**	SOIL
CLIENT ID:	B0T0B0	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~5.20E-01~~		~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA7196~~
AM-241	1.26E+00	J	2.1E-01	2.8E-01	2.35E-02	pCi/g	89.80%	RICHRC5080
U-234	8.09E-01	J	1.3E-01	1.9E-01	3.32E-02	pCi/g	82.30%	RICHRC5030
U-235	5.47E-02	J	3.5E-02	3.7E-02	2.79E-02	pCi/g	82.30%	RICHRC5030
U-238	7.71E-01	J	1.3E-01	1.8E-01	2.99E-02	pCi/g	82.30%	RICHRC5030
PU-238	8.67E-02	J	4.3E-02	4.5E-02	1.47E-02	pCi/g	58.80%	RICHRC5010
PU239/40	3.00E+00		2.5E-01	4.6E-01	2.89E-02	pCi/g	58.80%	RICHRC5010
AM-241	4.10E-02	U	1.5E-01	1.5E-01	2.52E-01	pCi/g	N/A	RICHRC5017
CO-60	4.43E+00		4.6E-01	4.6E-01	5.48E-02	pCi/g	N/A	RICHRC5017
CS-137	3.25E+01		3.3E+00	3.3E+00	9.24E-02	pCi/g	N/A	RICHRC5017
EU-152	3.06E+01		3.1E+00	3.1E+00	2.47E-01	pCi/g	N/A	RICHRC5017
EU-154	4.14E+00		4.9E-01	4.9E-01	1.91E-01	pCi/g	N/A	RICHRC5017
EU-155	2.23E-01	U	1.4E-01	1.4E-01	2.36E-01	pCi/g	N/A	RICHRC5017
U-238	1.64E-01	UJ	1.3E+00	1.3E+00	2.11E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	2.71E+00		2.0E-01	9.4E-01	1.37E-01	pCi/g	70.90%	RICHRC5006
NI-63	4.40E+02	J	7.8E+00	5.4E+01	5.36E+00	pCi/g	93.00%	RICHRC5069

Number of Results: 16

2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02614 / 6731
LAB SAMPLE ID:	81139504	MATRIX:	SOIL
CLIENT ID:	B0T0B1	DATE RECEIVED:	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~2.03E+00~~		~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA7196~~
AM-241	4.94E+00	J	3.7E-01	7.7E-01	1.88E-02	pCi/g	111.00%	RICHRC5080
U-234	1.24E+00		1.7E-01	2.7E-01	3.69E-02	pCi/g	76.90%	RICHRC5030
U-235	6.42E-02	J	4.0E-02	4.1E-02	2.97E-02	pCi/g	76.90%	RICHRC5030
U-238	1.24E+00		1.7E-01	2.7E-01	3.18E-02	pCi/g	76.90%	RICHRC5030
PU-238	6.26E-01	J	1.4E-01	1.7E-01	3.23E-02	pCi/g	40.20%	RICHRC5010
PU239/40	1.95E+01		7.9E-01	2.9E+00	3.23E-02	pCi/g	40.20%	RICHRC5010
AM-241	2.57E+00		5.2E-01	5.2E-01	5.02E-01	pCi/g	N/A	RICHRC5017
CO-60	3.49E+01		3.5E+00	3.5E+00	1.38E-01	pCi/g	N/A	RICHRC5017
CS-137	2.38E+02		2.4E+01	2.4E+01	2.69E-01	pCi/g	N/A	RICHRC5017
EU-152	3.20E+02		3.2E+01	3.2E+01	6.67E-01	pCi/g	N/A	RICHRC5017
EU-154	4.38E+01		4.5E+00	4.5E+00	5.30E-01	pCi/g	N/A	RICHRC5017
EU-155	1.71E+00		4.5E-01	4.5E-01	5.70E-01	pCi/g	N/A	RICHRC5017
U-238	-8.10E-01	UJ	2.6E+00	2.6E+00	4.20E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	6.82E+00		2.4E-01	2.1E+00	1.08E-01	pCi/g	63.00%	RICHRC5006
NI-63	2.70E+03	J	1.9E+01	3.1E+02	5.67E+00	pCi/g	87.90%	RICHRC5069

Number of Results: 16

2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result <

~~0009~~

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139505	**MATRIX:**	SOIL
CLIENT ID:	B0T0B2	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~1.25E+00~~		~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA7196~~
AM-241	1.36E+00	J	2.2E-01	3.1E-01	3.71E-02	pCi/g	81.60%	RICHRC5080
U-234	1.00E+00		1.4E-01	2.1E-01	2.93E-02	pCi/g	84.20%	RICHRC5030
U-235	3.38E-02	J	2.6E-02	2.7E-02	2.26E-02	pCi/g	84.20%	RICHRC5030
U-238	9.32E-01	J	1.4E-01	2.0E-01	3.06E-02	pCi/g	84.20%	RICHRC5030
PU-238	4.64E-02	J	3.8E-02	3.8E-02	2.09E-02	pCi/g	40.00%	RICHRC5010
PU239/40	4.05E+00		3.5E-01	6.7E-01	2.09E-02	pCi/g	40.00%	RICHRC5010
AM-241	4.48E-01		2.5E-01	2.5E-01	3.69E-01	pCi/g	N/A	RICHRC5017
CO-60	7.62E+00		7.8E-01	7.8E-01	6.21E-02	pCi/g	N/A	RICHRC5017
CS-137	8.58E+01		8.6E+00	8.6E+00	1.13E-01	pCi/g	N/A	RICHRC5017
EU-152	5.00E+01		5.0E+00	5.0E+00	2.99E-01	pCi/g	N/A	RICHRC5017
EU-154	6.84E+00		7.6E-01	7.6E-01	2.22E-01	pCi/g	N/A	RICHRC5017
EU-155	4.96E-01	U	2.2E-01	2.2E-01	2.61E-01	pCi/g	N/A	RICHRC5017
U-238	-2.02E-01	UJ	1.8E+00	1.8E+00	2.84E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	5.24E+00		2.2E-01	1.6E+00	1.26E-01	pCi/g	51.60%	RICHRC5006
NI-63	6.35E+02	J	9.4E+00	7.7E+01	5.46E+00	pCi/g	91.70%	RICHRC5069

Number of Results: 16

RLM 2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139506	**MATRIX:**	SOIL
CLIENT ID:	B0T0B3	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~1.29E+00~~		~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA7196~~
AM-241	1.42E+01		6.7E-01	2.2E+00	2.88E-02	pCi/g	97.90%	RICHRC5080
U-234	1.68E+00		1.9E-01	3.3E-01	3.02E-02	pCi/g	83.00%	RICHRC5030
U-235	4.93E-02	J	3.2E-02	3.3E-02	2.72E-02	pCi/g	83.00%	RICHRC5030
U-238	1.45E+00		1.7E-01	2.9E-01	2.72E-02	pCi/g	83.00%	RICHRC5030
PU-238	1.35E+00	J	2.4E-01	3.2E-01	2.95E-02	pCi/g	39.10%	RICHRC5010
PU239/40	5.13E+01		1.5E+00	8.3E+00	5.81E-02	pCi/g	39.10%	RICHRC5010
AM-241	4.92E+00		9.7E-01	9.7E-01	1.01E+00	pCi/g	N/A	RICHRC5017
CO-60	9.44E+01		9.5E+00	9.5E+00	2.38E-01	pCi/g	N/A	RICHRC5017
CS-137	1.41E+02		1.4E+01	1.4E+01	4.34E-01	pCi/g	N/A	RICHRC5017
EU-152	8.44E+02		8.4E+01	8.4E+01	9.64E-01	pCi/g	N/A	RICHRC5017
EU-154	1.04E+02		1.1E+01	1.1E+01	8.61E-01	pCi/g	N/A	RICHRC5017
EU-155	3.49E+00		8.1E-01	8.1E-01	1.06E+00	pCi/g	N/A	RICHRC5017
U-238	-2.52E+01	U J	6.5E+00	6.5E+00	8.40E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	7.15E+00		2.4E-01	2.3E+00	1.06E-01	pCi/g	61.10%	RICHRC5006
NI-63	6.14E+03	J	3.0E+01	7.0E+02	5.92E+00	pCi/g	89.40%	RICHRC5069

Number of Results: 16

RPM 2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result <

001

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139507	**MATRIX:**	SOIL
CLIENT ID:	B0T0B4	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~2.62E-01~~		~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA7196~~
AM-241	2.69E+00	J	3.0E-01	5.0E-01	3.91E-02	pCi/g	95.80%	RICHRC5080
U-234	9.87E-01	J	1.4E-01	2.1E-01	3.03E-02	pCi/g	85.80%	RICHRC5030
U-235	4.29E-02	J	2.9E-02	3.0E-02	2.44E-02	pCi/g	85.80%	RICHRC5030
U-238	9.67E-01	J	1.4E-01	2.1E-01	3.15E-02	pCi/g	85.80%	RICHRC5030
PU-238	2.56E-01	J	8.9E-02	9.6E-02	2.10E-02	pCi/g	58.90%	RICHRC5010
PU239/40	1.05E+01		5.7E-01	1.6E+00	3.54E-02	pCi/g	58.90%	RICHRC5010
AM-241	4.61E-01	U	5.5E-01	5.5E-01	9.07E-01	pCi/g	N/A	RICHRC5017
CO-60	1.59E+01		1.6E+00	1.6E+00	7.53E-02	pCi/g	N/A	RICHRC5017
CS-137	3.54E+01		3.5E+00	3.5E+00	1.42E-01	pCi/g	N/A	RICHRC5017
EU-152	8.48E+01		8.5E+00	8.5E+00	3.27E-01	pCi/g	N/A	RICHRC5017
EU-154	1.06E+01		1.1E+00	1.1E+00	2.70E-01	pCi/g	N/A	RICHRC5017
EU-155	3.70E-01	U	2.8E-01	2.8E-01	3.95E-01	pCi/g	N/A	RICHRC5017
U-238	1.03E-01	U J	3.5E+00	3.5E+00	5.81E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	2.07E+00		1.3E-01	6.3E-01	9.55E-02	pCi/g	66.50%	RICHRC5006
NI-63	2.02E+03	J	1.6E+01	2.3E+02	5.42E+00	pCi/g	91.80%	RICHRC5069

Number of Results: 16

RPM 2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL, J = No U qualifier and result <

~~0012~~

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139501	**MATRIX:**	SOIL
CLIENT ID:	B0T0D3	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~3.00E-02~~	~~U~~	~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA7196~~
AM-241	4.93E-01	J	1.5E-01	1.7E-01	3.18E-02	pCi/g	87.90%	RICHRC5080
U-234	8.44E-01	J	1.2E-01	1.7E-01	2.14E-02	pCi/g	96.20%	RICHRC5030
U-235	2.08E-02	J	1.9E-02	1.9E-02	1.96E-02	pCi/g	96.20%	RICHRC5030
U-238	7.46E-01	J	1.1E-01	1.6E-01	3.27E-02	pCi/g	96.20%	RICHRC5030
PU-238	0.00E+00	U J	0.0E+00	1.7E-02	1.56E-02	pCi/g	53.40%	RICHRC5010
PU239/40	3.98E-02		3.0E-02	3.1E-02	2.32E-02	pCi/g	53.40%	RICHRC5010
AM-241	-2.43E-03	U	2.5E-02	2.5E-02	3.49E-02	pCi/g	N/A	RICHRC5017
CO-60	1.72E-02	U	2.3E-02	2.3E-02	4.13E-02	pCi/g	N/A	RICHRC5017
CS-137	1.99E-02	U	2.2E-02	2.2E-02	3.75E-02	pCi/g	N/A	RICHRC5017
EU-152	9.76E-02	~~U~~	9.1E-02	9.1E-02	8.92E-02	pCi/g	N/A	RICHRC5017
EU-154	-6.14E-02	U	7.4E-02	7.4E-02	1.20E-01	pCi/g	N/A	RICHRC5017
EU-155	1.87E-02	U	3.6E-02	3.6E-02	6.06E-02	pCi/g	N/A	RICHRC5017
U-238	7.85E-01	J	3.7E-01	3.7E-01	3.44E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	5.11E-03	U	3.5E-02	3.5E-02	1.09E-01	pCi/g	56.40%	RICHRC5006
NI-63	-1.08E-01	U	2.5E+00	7.4E+00	6.37E+00	pCi/g	80.50%	RICHRC5069

Number of Results: 16

RPR 2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result <

0006

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139502	**MATRIX:**	SOIL
CLIENT ID:	B0T0D4	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~3.00E-02~~	~~U~~	~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA7196~~
AM-241	3.52E-01	J	1.3E-01	1.4E-01	3.07E-02	pCi/g	98.80%	RICHRC5080
U-234	1.07E+00		1.5E-01	2.3E-01	3.07E-02	pCi/g	76.00%	RICHRC5030
U-235	3.50E-02	J	2.9E-02	2.9E-02	3.36E-02	pCi/g	76.00%	RICHRC5030
U-238	9.19E-01	J	1.4E-01	2.1E-01	3.84E-02	pCi/g	76.00%	RICHRC5030
PU-238	5.32E-03	U J	1.1E-02	1.1E-02	1.44E-02	pCi/g	57.50%	RICHRC5010
PU239/40	1.55E-02	U	1.8E-02	1.9E-02	2.14E-02	pCi/g	57.50%	RICHRC5010
AM-241	1.87E-02	U	2.2E-02	2.2E-02	3.20E-02	pCi/g	N/A	RICHRC5017
CO-60	1.72E-02	U	2.1E-02	2.1E-02	3.86E-02	pCi/g	N/A	RICHRC5017
CS-137	1.98E-02	U	2.0E-02	2.0E-02	3.48E-02	pCi/g	N/A	RICHRC5017
EU-152	1.38E-01	U	7.0E-02	7.0E-02	8.92E-02	pCi/g	N/A	RICHRC5017
EU-154	-5.38E-03	U	6.5E-02	6.5E-02	1.11E-01	pCi/g	N/A	RICHRC5017
EU-155	1.48E-02	U	3.3E-02	3.3E-02	5.50E-02	pCi/g	N/A	RICHRC5017
U-238	6.08E-01	J	2.6E-01	2.6E-01	3.07E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	1.50E-02	U	3.5E-02	3.5E-02	1.07E-01	pCi/g	57.00%	RICHRC5006
NI-63	4.56E-01	U	2.6E+00	7.4E+00	6.79E+00	pCi/g	80.70%	RICHRC5069

Number of Results: 16

RPM
2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139503	**MATRIX:**	SOIL
CLIENT ID:	B0T0D5	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~3.00E-02~~	~~U~~	~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA7196~~
AM-241	2.50E-02	U	2.9E-02	2.9E-02	3.07E-02	pCi/g	90.00%	RICHRC5080
U-234	1.92E-01	J	5.6E-02	6.3E-02	1.87E-02	pCi/g	101.40%	RICHRC5030
U-235	1.57E-02	U	1.6E-02	1.7E-02	1.87E-02	pCi/g	101.40%	RICHRC5030
U-238	2.78E-01	J	6.8E-02	7.9E-02	1.65E-02	pCi/g	101.40%	RICHRC5030
PU-238	-4.31E-04	U J	8.6E-04	8.6E-04	2.17E-02	pCi/g	56.40%	RICHRC5010
PU239/40	1.03E-02	U	1.5E-02	1.5E-02	2.16E-02	pCi/g	56.40%	RICHRC5010
AM-241	3.39E-02	U	3.3E-02	3.3E-02	5.62E-02	pCi/g	N/A	RICHRC5017
CO-60	2.06E-03	U	1.9E-02	1.9E-02	3.32E-02	pCi/g	N/A	RICHRC5017
CS-137	8.36E-03	U	1.6E-02	1.6E-02	2.89E-02	pCi/g	N/A	RICHRC5017
EU-152	-1.27E-02	U	4.0E-02	4.0E-02	6.46E-02	pCi/g	N/A	RICHRC5017
EU-154	-5.39E-03	U	5.4E-02	5.4E-02	9.43E-02	pCi/g	N/A	RICHRC5017
EU-155	-1.10E-03	U	2.8E-02	2.8E-02	4.82E-02	pCi/g	N/A	RICHRC5017
U-238	1.77E-01	U J	5.2E-01	5.2E-01	4.85E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	9.34E-03	U	2.5E-02	2.5E-02	7.94E-02	pCi/g	86.90%	RICHRC5006
NI-63	2.36E+00	U	2.1E+00	6.1E+00	4.97E+00	pCi/g	102.70%	RICHRC5069

Number of Results: 16

RPD 2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139511	**MATRIX:**	SOIL
CLIENT ID:	B0T0F9	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~1.70E-01~~		~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA 7196~~
AM-241	1.60E-01	J	7.0E-02	7.4E-02	2.06E-02	pCi/g	102.70%	RICHRC5080
U-234	1.39E+00		2.1E-01	3.3E-01	4.29E-02	pCi/g	54.80%	RICHRC5030
U-235	3.68E-02	J	3.4E-02	3.5E-02	3.47E-02	pCi/g	54.80%	RICHRC5030
U-238	1.38E+00		2.0E-01	3.3E-01	4.88E-02	pCi/g	54.80%	RICHRC5030
PU-238	-1.34E-03	U J	1.6E-03	1.6E-03	2.79E-02	pCi/g	59.80%	RICHRC5010
PU239/40	1.06E-01		4.9E-02	5.1E-02	1.52E-02	pCi/g	59.80%	RICHRC5010
AM-241	5.46E-02	U	4.9E-02	4.9E-02	7.25E-02	pCi/g	N/A	RICHRC5017
CO-60	1.62E-02	U	2.4E-02	2.4E-02	4.27E-02	pCi/g	N/A	RICHRC5017
CS-137	1.83E-01		4.1E-02	4.1E-02	3.75E-02	pCi/g	N/A	RICHRC5017
EU-152	1.32E+00		1.8E-01	1.8E-01	8.12E-02	pCi/g	N/A	RICHRC5017
EU-154	6.13E-02	U	7.5E-02	7.5E-02	1.32E-01	pCi/g	N/A	RICHRC5017
EU-155	4.26E-02	U	4.0E-02	4.0E-02	6.88E-02	pCi/g	N/A	RICHRC5017
U-238	1.09E+00	J	7.3E-01	7.3E-01	6.55E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	5.40E-01	J	9.6E-02	2.0E-01	1.40E-01	pCi/g	72.40%	RICHRC5006
NI-63	4.85E+00	U	2.4E+00	7.0E+00	5.52E+00	pCi/g	90.20%	RICHRC5069

Number of Results: 16

RMC 2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02614 / 6731
LAB SAMPLE ID:	81139512	MATRIX:	SOIL
CLIENT ID:	B0T0H0	DATE RECEIVED:	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~3.00E-02~~	~~U~~	~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA7196~~
AM-241	1.75E-01	J	7.0E-02	7.4E-02	1.89E-02	pCi/g	111.80%	RICHRC5080
U-234	1.54E+00		2.2E-01	3.6E-01	3.46E-02	pCi/g	55.90%	RICHRC5030
U-235	2.03E-02	U	2.6E-02	2.7E-02	4.05E-02	pCi/g	55.90%	RICHRC5030
U-238	1.46E+00		2.1E-01	3.4E-01	4.29E-02	pCi/g	55.90%	RICHRC5030
PU-238	0.00E+00	U J	0.0E+00	2.0E-02	1.77E-02	pCi/g	52.00%	RICHRC5010
PU239/40	3.22E-02		2.9E-02	3.0E-02	2.63E-02	pCi/g	52.00%	RICHRC5010
AM-241	5.87E-02	U	1.2E-01	1.2E-01	1.78E-01	pCi/g	N/A	RICHRC5017
CO-60	1.19E-02	U	3.8E-02	3.8E-02	6.68E-02	pCi/g	N/A	RICHRC5017
CS-137	1.08E-01		5.3E-02	5.3E-02	5.96E-02	pCi/g	N/A	RICHRC5017
EU-152	8.22E-01	U	1.8E-01	1.8E-01	1.97E-01	pCi/g	N/A	RICHRC5017
EU-154	-7.13E-02	U	1.1E-01	1.1E-01	1.87E-01	pCi/g	N/A	RICHRC5017
EU-155	9.63E-02	U	7.5E-02	7.5E-02	1.26E-01	pCi/g	N/A	RICHRC5017
U-238	4.92E+00	J	1.7E+00	1.7E+00	1.51E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	9.63E-02	U	5.3E-02	6.2E-02	1.38E-01	pCi/g	72.40%	RICHRC5006
NI-63	3.44E+00	U	2.4E+00	7.1E+00	5.71E+00	pCi/g	87.30%	RICHRC5069

Number of Results: 16

RK 2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL, J = No U qualifier and result <

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139513	**MATRIX:**	SOIL
CLIENT ID:	B0T0H1	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~4.00E-02~~		~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA 196~~
AM-241	8.46E-02	~~U~~ J	5.3E-02	5.5E-02	2.29E-02	pCi/g	92.00%	RICHRC5080
U-234	1.97E-01	J	6.7E-02	7.5E-02	3.03E-02	pCi/g	74.10%	RICHRC5030
U-235	9.53E-03	U	1.6E-02	1.6E-02	3.03E-02	pCi/g	74.10%	RICHRC5030
U-238	2.19E-01	J	7.1E-02	8.0E-02	3.20E-02	pCi/g	74.10%	RICHRC5030
PU-238	-9.28E-04	U J	1.3E-03	1.3E-03	2.65E-02	pCi/g	71.10%	RICHRC5010
PU239/40	4.87E-03	U	1.2E-02	1.2E-02	2.65E-02	pCi/g	71.10%	RICHRC5010
AM-241	-5.81E-03	U	5.5E-02	5.5E-02	9.30E-02	pCi/g	N/A	RICHRC5017
CO-60	-1.10E-02	U	1.8E-02	1.8E-02	3.05E-02	pCi/g	N/A	RICHRC5017
CS-137	-2.04E-03	U	1.6E-02	1.6E-02	2.65E-02	pCi/g	N/A	RICHRC5017
EU-152	-1.59E-02	U	3.6E-02	3.6E-02	6.07E-02	pCi/g	N/A	RICHRC5017
EU-154	-3.45E-02	U	5.7E-02	5.7E-02	9.51E-02	pCi/g	N/A	RICHRC5017
EU-155	1.91E-02	U	2.9E-02	2.9E-02	5.03E-02	pCi/g	N/A	RICHRC5017
U-238	1.74E-01	U J	9.2E-01	9.2E-01	7.32E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	4.73E-02	U	3.7E-02	4.1E-02	1.11E-01	pCi/g	95.20%	RICHRC5006
NI-63	3.85E+00	U	2.1E+00	6.3E+00	4.97E+00	pCi/g	103.10%	RICHRC5069

Number of Results: 16

RMC
2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result <

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rptChemRadSample; v3.41

DATA

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02614 / 6731
LAB SAMPLE ID:	81139508	MATRIX:	SOIL
CLIENT ID:	B0T098	DATE RECEIVED:	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~1.00E+00~~		~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA7196~~
AM-241	8.95E-01	J	1.8E-01	2.3E-01	3.36E-02	pCi/g	89.20%	RICHRC5080
U-234	7.73E-01	J	1.2E-01	1.7E-01	2.34E-02	pCi/g	88.40%	RICHRC5030
U-235	1.61E-02	U	1.9E-02	1.9E-02	2.90E-02	pCi/g	88.40%	RICHRC5030
U-238	7.61E-01	J	1.2E-01	1.7E-01	3.32E-02	pCi/g	88.40%	RICHRC5030
PU-238	9.20E-02	J	4.3E-02	4.5E-02	1.38E-02	pCi/g	62.10%	RICHRC5010
PU239/40	2.33E+00		2.2E-01	3.6E-01	2.05E-02	pCi/g	62.10%	RICHRC5010
AM-241	2.60E-01		9.0E-02	9.0E-02	1.28E-01	pCi/g	N/A	RICHRC5017
CO-60	8.90E+00		9.1E-01	9.1E-01	7.95E-02	pCi/g	N/A	RICHRC5017
CS-137	1.04E+02		1.0E+01	1.0E+01	1.33E-01	pCi/g	N/A	RICHRC5017
EU-152	2.75E+01		2.8E+00	2.8E+00	4.17E-01	pCi/g	N/A	RICHRC5017
EU-154	4.37E+00		5.4E-01	5.4E-01	2.79E-01	pCi/g	N/A	RICHRC5017
EU-155	1.30E-01	U	1.5E-01	1.5E-01	2.55E-01	pCi/g	N/A	RICHRC5017
U-238	-5.74E-01	U J	8.7E-01	8.7E-01	1.21E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	3.77E+00		2.3E-01	1.2E+00	1.38E-01	pCi/g	73.30%	RICHRC5006
NI-63	5.67E+02	J	9.2E+00	6.9E+01	5.75E+00	pCi/g	86.60%	RICHRC5069

Number of Results: 16

2/2/99

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	81139509	**MATRIX:**	SOIL
CLIENT ID:	B0T099	**DATE RECEIVED:**	11/24/98 1:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
~~HEXCHROME~~	~~1.30E-01~~		~~N/A~~	~~N/A~~	~~3.00E-02~~	~~mg/kg~~	~~N/A~~	~~EPA7196~~
AM-241	7.28E-01	J	1.7E-01	2.0E-01	2.56E-02	pCi/g	86.50%	RICHRC5080
U-234	8.48E-01	J	1.3E-01	1.8E-01	2.18E-02	pCi/g	87.50%	RICHRC5030
U-235	4.22E-02	J	2.9E-02	2.9E-02	2.18E-02	pCi/g	87.50%	RICHRC5030
U-238	7.87E-01	J	1.2E-01	1.7E-01	1.92E-02	pCi/g	87.50%	RICHRC5030
PU-238	7.21E-02	J	4.2E-02	4.3E-02	2.78E-02	pCi/g	50.90%	RICHRC5010
PU239/40	2.51E+00		2.5E-01	4.1E-01	2.78E-02	pCi/g	50.90%	RICHRC5010
AM-241	4.23E-01	U	3.8E-01	3.8E-01	6.34E-01	pCi/g	N/A	RICHRC5017
CO-60	1.95E+01		2.0E+00	2.0E+00	1.09E-01	pCi/g	N/A	RICHRC5017
CS-137	1.61E+02		1.6E+01	1.6E+01	1.96E-01	pCi/g	N/A	RICHRC5017
EU-152	6.70E+01		6.8E+00	6.8E+00	5.20E-01	pCi/g	N/A	RICHRC5017
EU-154	1.06E+01		1.2E+00	1.2E+00	3.60E-01	pCi/g	N/A	RICHRC5017
EU-155	5.29E-01	U	2.5E-01	2.5E-01	4.13E-01	pCi/g	N/A	RICHRC5017
U-238	1.76E+00	UJ	3.0E+00	3.0E+00	4.73E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	3.89E+00		2.3E-01	1.3E+00	1.37E-01	pCi/g	74.70%	RICHRC5006
NI-63	4.37E+02	J	8.0E+00	5.4E+01	5.60E+00	pCi/g	89.90%	RICHRC5069

Number of Results: 16

PLC 2/2/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result <

Quanterra Analytical Services, Inc

rptChemRadSample; v3.41

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

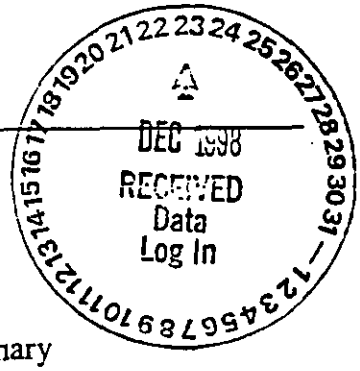
Quanterra

CERTIFICATE OF ANALYSIS

Bechtel Hanford, Inc.
3350 George Washington Way
Richland, WA 99352

December 23, 1998

Attention: Joan Kessner



SAF Number	:	B99-002
Date First Sample Received	:	November 24, 1998
Number of Samples	:	13
Sample Type	:	Soil
SDG Number	:	W02614
Data Deliverable	:	21 Day Priority / 28 Day Summary

I. Introduction

On November 24, 1998, the Quanterra Environmental Services Richland Laboratory (QESRL) received 13-priority soil samples for a 21-day priority radiochemical and chemical analysis. Upon receipt, the samples were assigned the following laboratory ID numbers to correspond with the Bechtel Hanford, Inc. (BHI) specific IDs:

QESRL ID#	BHI ID#	MATRIX	DATE OF RECEIPT
81139501	B0T0D3	Soil	11/24/98
81139502	B0T0D4	Soil	11/24/98
81139503	B0T0D5	Soil	11/24/98
81139504	B0T0B1	Soil	11/24/98
81139505	B0T0B2	Soil	11/24/98
81139506	B0T0B3	Soil	11/24/98
81139507	B0T0B4	Soil	11/24/98
81139508	B0T098	Soil	11/24/98
81139509	B0T099	Soil	11/24/98
81139510	B0T0B0	Soil	11/24/98
81139511	B0T0F9	Soil	11/24/98
81139512	B0T0H0	Soil	11/24/98
81139513	B0T0H1	Soil	11/24/98

0002

II. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information; analytical results and the appropriate associated statistical errors.

The requested analyses were:

Alpha Spectroscopy
Americium-241 by method RICH-RC-5080
Plutonium-238, -239/40 by method RICH-RC-5010
Uranium-234, -235, -238 by method RICH-RC-5030
Gamma Spectroscopy
Gamma Scan by method RICH-RC-5017
Gas Proportional Counting
Total Strontium by method RICH-RC-5006
Liquid Scintillation Counting
Nickel-63 by method RICH-RC-5069
Chemical Analyses
Chromium Hex by EPA method 7196

III. Quality Control

The analytical results for each analysis performed under SDG W02614 includes a minimum of two Laboratory Control Samples (LCS) and one method (reagent) blank. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results.

IV. Comments

Alpha Spectroscopy

Americium-241 by method RICH-RC-5080
The LCS, batch blank, sample duplicate (B0T0B4) and sample results are within contractual requirements. There was a matrix blank and spike analyzed with this sample batch and the results are within the contractual requirements.

Plutonium-238, -239/40 by method RICH-RC-5062
The LCS, batch blank, sample duplicate (B0T0B4) and sample results are within contractual requirements. There was a matrix blank and spike analyzed with this sample batch and the results are within the contractual requirements.

Uranium-234, -235, -238 by method RICH-RC-5030
The LCS, batch blank, sample duplicate (B0T0B4) and sample results are within contractual requirements. Samples B0T0D5, B0T0B1, B0T0B4, B0T098, B0T099 and B0T0B0 had Pu-239 peaks present in the uranium spectrum. The presence of the Pu-239 peak did not interfere with the uranium results.

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017
The LCS, batch blank, sample duplicate (B0T0D3) and sample results are within contractual requirements.

Gas Proportional Counting

Total Strontium by method RICH-RC-5006
The LCS, batch blank, sample duplicate (B0T0H1) and sample results are within contractual requirements.

Liquid Scintillation Counting

Nickel-63 by method RICH-RC-5069
The LCS, sample duplicate (B0T0B4), matrix spike (B0T0B4), batch blank and sample results are within contractual requirements.

Chemical Analyses

Chromium Hex by EPA method 7196
The LCS, sample duplicate (B0T0H1), batch blank, matrix spike (B0T0H1) and sample results are within contractual requirements.

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

for Andy Kopriva
Project Manager

Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector Coffman/Fahlberg	**Company Contact** R Coffman	**Telephone No.** 373-6425	**Project Coordinator** TRENT, SJ
Project Designation 100 BC Areas - Full Protocol	**Sampling Location** 116-B-13		**SAF No.** B99-002
Ice Chest No. SML 314	**Field Logbook No.** EL 1327-1		**Method of Shipment**
Shipped To Quanterra Incorporated	**Offsite Property No.**		**Bill of Lading/Air Bill No.**
			COA

Price Code R.F. 11-23-98

Data Turnaround ~~15 Days~~ 21 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

	Preservation	Cool 4C	None	None	None	None	None	None	None	None	None
	Type of Container	aG	aG	aG	aG	aG	aG	P	aG	aG	Marinelli
	No. of Container(s)	0	0	~~0~~ RF 11-23-98	0	0	0	1	1	1	1
	Volume	60mL	60mL	60mL	60mL	60mL	60mL	20mL	60mL	60mL	500mL
SAMPLE ANALYSIS 811394 SDL W02614		Chromium Hex - 7196 811395	ICP Metals - 6010A (Add-on) (Lead)	ICP Metals - 6010A (SW-846) (Chromium, Lead)	Mercury - 7471 - (CV)	Nickel-63 811395	Strontium-89,90 -- Total Sr	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium 811395	ICP Metals - 6010A (TAL)	See item (1) in Special Instructions 811395

Sample No.	Matrix *	Sample Date	Sample Time	Chromium Hex	ICP Metals (Add-on)	ICP Metals (SW-846)	Mercury	Nickel-63	Strontium-89,90	Activity Scan	Americium-241 / Isotopic Pu / U	ICP Metals (TAL)	See item (1)
				[redacted]									
B0T0D3 01	Soil	~~1420~~ 11-23-98	1420	X		X	X	X	X	X	X		X
B0T0D4 02	Soil	11-23-98	1430	X		X	X	X	X	X	X		X
B0T0D5 03	soil	11-23-98	1415	X		X	X	X	X	X	X		X

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers [signature]	11-24-98/1300	[signature] Fahlberg	11-24-98 1300
		LICOLP [signature]	

SPECIAL INSTRUCTIONS

** The ERC contractor acknowleges the 24-hour holding time is not likely achievable for Hex Chrom by EPA 7196.

** Use a separate Chain of Custody for each waste site.

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

B0T0D3 = B0T140

B0T0D4 = B0T146

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

000031

0035

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-002-05	Page 1 of 1

Collector Coffman/Fahlberg	**Company Contact** R Coffman	**Telephone No.** 373-6425	**Project Coordinator** TRENT, SJ
Project Designation 100 BC Areas - Full Protocol	**Sampling Location** 116-B-11		**SAF No.** B99-002
Ice Chest No. SML 314	**Field Logbook No.** EL 1327-1		**Method of Shipment**
Shipped To Quanterra Incorporated	**Offsite Property No.**		**Bill of Lading/Air Bill No.**
POSSIBLE SAMPLE HAZARDS/REMARKS			
Special Handling and/or Storage			

Data Turnaround ~~15 Days~~ 21 DAYS

SAMPLE ANALYSIS 811394

Sample No.	Matrix *	Sample Date	Sample Time	Cool 4C	None	None	None	None	None	None	None	None	None
Preservation													
Type of Container				aG	aG	aG	aG	aG	aG	P	aG	aG	Marinelli
No. of Container(s)				0	0	0	0	0	0	1	1	1	1
Volume				60mL	60mL	60mL	60mL	60mL	60mL	20mL	60mL	60mL	500mL
				Chromium Hex - 7196	ICP Metals - 6010A (Add-on) (Lead)	ICP Metals - 6010A (SW-846) (Chromium, Lead)	Mercury - 7471 - (CV)	Nickel-63	Strontium-89,90 -- Total Sr	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium	ICP Metals - 6010A (TAL)	See item (1) in Special Instructions
				811395				811	395		811395		811395
B0T0B1	04	Soil	11/20/98	1345	X	X	X	X	X	X	X	X	X
B0T0B2	05	Soil	11/20/98	1330	X	X	X	X	X	X	X	X	X
B0T0B3	06	Soil	11/20/98	1300	X	X	X	X	X	X	X	X	X
B0T0B4	07	Soil	11/20/98	1230	X	X	X	X	X	X	X	X	X

CHAIN OF POSSESSION — **Sign/Print Names**

	Date/Time		Date/Time
Relinquished By Doug Bowers Doug Bowers	11-24-98/1300	Received By	11-24-98 1300
Relinquished By	Date/Time	Received By 2100cpm	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

** The ERC contractor acknowleges the 24-hour holding time is not likely achievable for Hex Chrom by EPA 7196.

** Use a separate Chain of Custody for each waste site.

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

Matrix *

S	=	Soil
SE	=	Sediment
SO	=	Solid
SL	=	Sludge
W	=	Water
O	=	Oil
A	=	Air
DS	=	Drum Solids
DL	=	Drum Liquids
T	=	Tissue
WI	=	Wipe
L	=	Liquid
V	=	Vegetation
X	=	Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-002-04	Page 1 of 1

Collector Coffman/Fahlberg	**Company Contact** R Coffman **Telephone No.** 373-6425	**Project Coordinator** TRENT, SJ	**Data Turnaround** ~~15 Days~~ 21 DAYS
Project Designation 100 BC Areas - Full Protocol	**Sampling Location** 116-B-11	**SAF No.** B99-002	
Ice Chest No. SML 314	**Field Logbook No.** EL 1327-1	**Method of Shipment**	
Shipped To Quanterra Incorporated	**Offsite Property No.**	**Bill of Lading/Air Bill No.**	
POSSIBLE SAMPLE HAZARDS/REMARKS			
Special Handling and/or Storage			

SAMPLE ANALYSIS 811394

Sample No.		Matrix *	Sample Date	Sample Time	Preservation	Cool 4C	None	None	None	None	None	None	None	None	None
					Type of Container	aG	aG	aG	aG	aG	aG	P	aG	aG	Marinelli
					No. of Container(s)	0	0	1	0	0	0	1	1	1	1
					Volume	60mL	60mL	60mL	60mL	60mL	60mL	20mL	60mL	60mL	500mL
						Chromium Hex - 7196	ICP Metals - 6010A (Add-on) (Lead)	ICP Metals - 6010A (SW-846) (Chromium, Lead)	Mercury - 7471 - (CV)	Nickel-63	Strontium-89,90 -- Total Sr	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium	ICP Metals - 6010A (TAL)	See item (1) in Special Instructions
						811395				811	395		811395		811395
B0T098	08	Soil	11/20/98	0810		X		X	X	X	X	X	X		X
B0T099	09	Soil	11/20/98	0810		X		X	X	X	X	X	X		X
B0T0B0	10	Soil	11/20/98	1350		X		X	X	X	X	X	X		X

0003

CHAIN OF POSSESSION

Sign/Print Names			
Relinquished By Doug Bowers	Date/Time 11-24-98/1300	Received By Heidelberg	Date/Time 11-24-98
Relinquished By Doug Bowers	Date/Time	Received By 2100 Cpny	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

** The ERC contractor acknowleges the 24-hour holding time is not likely achievable for Hex Chrom by EPA 7196.

** Use a separate Chain of Custody for each waste site.

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

B0T098 = B0T0H9 B0T0B0 = B0T0H1
B0T099 B0T0H9

Matrix *

S	Soil
SE	Sediment
SO	Solid
SL	Sludge
W	Water
O	Oil
A	Air
DS	Drum Solids
DL	Drum Liquids
T	Tissue
WI	Wipe
L	Liquid
V	Vegetation
X	Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-002-17	Page 1 of 1

Collector Coffman/Fahlberg	Company Contact R Coffman	Telephone No. 373-6425	Project Coordinator TRENT, SJ
Project Designation 100 BC Areas - Full Protocol	Sampling Location 116-B-14		SAF No. B99-002
Ice Chest No. SML 314	Field Logbook No. EL 1327-1		Method of Shipment
Shipped To Quanterra Incorporated	Offsite Property No.		Bill of Lading/Air Bill No.
			COA

Price Code | Data Turnaround: ~~15 Days~~ 21 Days R.F. 11.23.98

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

000083

SAMPLE ANALYSIS 811394

			Preservation	Cool 4C	None	None	None	None	None	None	None	None	None
			Type of Container	aG	aG	aG	aG	aG	aG	P	aG	aG	Marinelli
			No. of Container(s)	0	0	~~0~~ 1	0	0	0	1	1	1	1
			Volume	60mL	60mL	60mL	60mL	60mL	60mL	20mL	60mL	60mL	500mL
				Chromium Hex - 7196	ICP Metals - 6010A (Add-on) (Lead)	ICP Metals - 6010A (SW-846) (Chromium, Lead)	Mercury - 7471 - (CV)	Nickel-63	Strontium-89,90 -- Total Sr	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium	ICP Metals - 6010A (TAL)	See item (1) in Special Instructions
				811395				811395			811395		811395
Sample No.	Matrix *	Sample Date	Sample Time	[redacted]									
B0T0F9 11	Soil	11.23.98	1400	X		X	X	X	X	X	X		X
B0T0H0 12	Soil	11.23.98	1415	X		X	X	X	X	X	X		X
~~B0T0H1~~ RE. 11.23.98	~~Soil~~												~~X~~ 11.23 RS
B0T0H1 13	Soil	11.23.98	1400	X		X	X	X	X	X	X		X

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By Doug Bowers	Date/Time 11-24-98/1300	Received By Fahlberg LIDOC P	Date/Time 11-24-98 1300
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

** The ERC contractor acknowleges the 24-hour holding time is not likely achievable for Hex Chrom by EPA 7196.

** Use a separate Chain of Custody for each waste site.

(1) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Americium-241, Uranium-238}

B0T0F9 = B0T1R9

B0T0H0 = B0T1T2

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5

Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 100-BC WS 116-B-11 / 13 / 14			DATA PACKAGE: W02614		
VALIDATOR: TLI		LAB: QES		DATE: 2/1/95	
CASE:			SDG: W02614		

ANALYSES PERFORMED

☒ Gross Alpha/Beta	☒ Strontium-90	☐ Technetium-99	☒ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☐ Total Uranium	☐ Radium-22	☐ Tritium	☒ Ni-63		

SAMPLES/MATRIX

B0T0B0, B0T0B1, B0T0B2, B0T0B4, B0T0D3
B0T0D4, B0T0D5, B0T0F9, B0T0H0, B0T0H1
B0T098, B0T099, B0T0B3,

1. Completeness . . . . . ☒ N/A

Technical verification forms present? . . . . . Yes No N/A

Comments: _____

2. Initial Calibration . . . . . ☒ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes No N/A

Initial calibration acceptable? . . . . . Yes No N/A

Standards NIST traceable? . . . . . Yes No N/A

Standards Expired? . . . . . Yes No N/A

Comments: _____

3. Continuing Calibration . . . . . ☒ N/A

Calibration checked within one week of sample analysis? . . .	Yes	No	N/A
Calibration check acceptable?	Yes	No	N/A
Calibration check standards NIST traceable?	Yes	No	N/A
Calibration check standards expired?	Yes	No	N/A

Comments: _____

4. Blanks . . . . . ☐ N/A

Method blank analyzed?	(Yes)	No	N/A
Method blank results acceptable?	(Yes)	No	N/A
Analytes detected in method blank?	Yes	(No)	N/A
Field blank(s) analyzed?	(Yes)	No	N/A
Field blank results acceptable?	Yes	(No)	N/A
Analytes detected in field blank(s)?	(Yes)	No	N/A
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments: U-234, U-238 in B0T0D5 (FB)
Am-241, U-234, U-238 in BOTOM7 (EB)

5. Matrix Spikes . . . . . ☐ N/A

Matrix spike analyzed?	(Yes)	No	N/A
Spike recoveries acceptable?	Yes	(No)	N/A
Spike source traceable?	Yes	No	(N/A)
Spike source expired?	Yes	No	(N/A)
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments: Ni-63 500.27 %. J detects

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed?	(Yes)	No	N/A
LCS recoveries acceptable?	(Yes)	No	N/A
LCS traceable?	Yes	No	(N/A)
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments: No Pu-238 LCS — J all

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added?	(Yes)	No	N/A
Chemical recovery acceptable?	Yes	(No)	N/A
Chemical carrier traceable?	Yes	No	(N/A)
Chemical carrier expired?	Yes	No	(N/A)
Transcription/Calculation errors?	Yes	No	(N/A)

Comments: Am-241 yield 111%. — [redacted] J — Ho, Bi
(& Assoc)

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed?	(Yes)	No	N/A
RPD Values Acceptable?	Yes	(No)	N/A
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments: U-238 (GEA) ~~36%~~ 36.4% ~~2[redacted]~~ J/UJ

A-3

9. Field QC Samples . . . . . ☐ N/A

Field duplicate sample(s) analyzed?	Yes	No	N/A
Field duplicate RPD values acceptable?	Yes	No	N/A
Field split sample(s) analyzed?	Yes	No	N/A
Field split RPD values acceptable?	Yes	No	N/A
Performance audit sample(s) analyzed?	Yes	No	N/A
Performance audit sample results acceptable?	Yes	No	N/A

Comments: AM-241 (Gm) 47.7% CO-60 74.6% CS137 43%
EU-152 83% EU-154 83% EU 155 121%

10. Holding Times

Are sample holding times acceptable? . . . . . Yes No N/A

Comments:

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses?	Yes	No	N/A
Results supported in raw data?	Yes	No	N/A
Results Acceptable?	Yes	No	N/A
Transcription/Calculation errors?	Yes	No	N/A
MDA's meet required detection limits?	Yes	No	N/A
Transcription/calculation errors?	Yes	No	N/A

Comments: B0T0D3 - AM241 ~~(Gm)~~ B0T0D4 ~~A-241 (Gm)~~ ~~B4-EU-152~~
~~H2-152~~ B0-155 ~~D2-155~~ B4-155 98-155
U-238 (B0, B4, D5, H1)

A-4

Quanterra

MATRIX SPIKE RESULTS

LAB NAME: QUANTERRA, Richland **SDG: /RPT GRP:** W02614 / 6731

LAB SAMPLE ID: W1139507 **MATRIX:** SOIL

ANALYTE	SPIKE RESULT*	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	SAMPLE RESULT	EXPECTED	RECOVERY
NI-63	2.53E+03		1.9E+01	2.9E+02	5.82E+00	pCi/g	2.02E+03	5.05E+02	500.27%

Number of Results: 1

*Spike Result Corrected For Sample Result

Result = IDL When Not Detecte

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result < RDL.

Quanterra Analytical Services, Inc

rptChemRadMatrixSpike; v3.41

0026

Quanterra

DUPLICATE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02614 / 6731
LAB SAMPLE ID:	D1139501	**MATRIX:**	SOIL
CLIENT ID:	B0T0D3	**DATE RECEIVED:**	11/24/98 1:00:00 P
ORIG LAB SAMPLE ID:	81139501		

ANALYTE	DUP RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	METHOD NUMBER	ORIG RESULT	RPD
AM-241	-1.38E-01	U	1.5E-01	1.5E-01	2.45E-01	pCi/g	N/A	RICHRC5017	-2.43E-03	193.08%
CO-60	2.03E-02	U	2.2E-02	2.2E-02	3.96E-02	pCi/g	N/A	RICHRC5017	1.72E-02	16.37%
CS-137	1.15E-02	U	1.9E-02	1.9E-02	3.28E-02	pCi/g	N/A	RICHRC5017	1.99E-02	53.17%
EU-152	1.13E-01	U	6.9E-02	6.9E-02	8.58E-02	pCi/g	N/A	RICHRC5017	9.76E-02	14.59%
EU-154	-1.82E-02	U	6.5E-02	6.5E-02	1.09E-01	pCi/g	N/A	RICHRC5017	-6.14E-02	108.38%
EU-155	7.04E-02	U	5.1E-02	5.1E-02	7.76E-02	pCi/g	N/A	RICHRC5017	1.87E-02	116.16%
U-238	1.13E+00	U	1.0E+00	1.0E+00	1.72E+00	pCi/g	N/A	RICHRC5017	7.85E-01	36.41%

Number of Results: 7

Result = IDL When Not Detecte

(Q)ualifiers: U = Analyte result < MDA/IDL,
J = No U qualifier and result < RDL.

Quanterra Analyticall Services, Inc

rptChemRadDup; v3.41

Review Comment Record (RCR)

1. Date	2. Review No.
2/23/99	BHI/QA99004
3. Project	4. Page
116-B-11, 13, 14	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
W02614 –QES (SDG No. W02614)	100-BC Areas – Full Protocol – Waste Sites - 116-B-11, 116-B-13, 116-B-14 Soil Samples	Claude Stacey	BHI/QA	H0-16/372-9208

17. Comment Submittal Approval:

Organization Manager (Optional) _____ Date _____

10. Agreement with indicated comment disposition(s)

Reviewer/Point of Contact _____ Date _____

Author/Originator _____

11. CLOSED

Reviewer/Point of Contact _____ Date _____

Author/Originator _____

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Radiochemistry and Inorganic: OK No Comments			
2				
3				
4				

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 2 February 1999

Information Request

W02614 - Radiochemistry

The blank analysis for hexchrome (which is in the rad package): The sample result is 0.002, the MDA is 0.002, and their is no U qualifier, thus indicating the result was detected. I would take this to indicate the blank was detected except in several samples (B0T0H0, B0T0D5, B0T0D4, B0T0D3) results reported the same as the MDA are flagged "U".

Is the reported result a detect or a nondetect?

Duncan, Jeanette M

From: Blumenkranz, David B
Sent: Friday, February 19, 1999 2:06 PM
To: Duncan, Jeanette M

Jeanette,

Responses to my comments (on 2/16/99) on validation packages W02613-QES, W02606-QES, and H0324-RLN are acceptable. If its not a change order or out of scope, please ask the validator if its possible to add the applicable site number in parenthesis after each samples number like, "B0T0F3 (116-B-14)". This would make my life much easier. Hopefully, the validator can accomidate our request. I talked to Jon and we decided tha as long as Rich can review/approve the validation packages for me, the validator can use next week to implement these changes. I'll be looking at validation package W02614-QES will get back to you later today.

Thanx,
Dave

Duncan, Jeanette M

From: Blumenkranz, David B
Sent: Friday, February 19, 1999 2:44 PM
To: Duncan, Jeanette M
Cc: Sturges, Mark H; Fancher, Jonathan D (Jon); Weiss, Richard L
Subject: Comments on Validation Package W02614-QES

Radiochemistry - Data Package W02614-QES:
Please indicate the site number in parenthesis after the sample number.
To the "Minor Deficiencies" section, please add "The following analytes and samples had reported MDAs above the TDL/MDA: europium-155 in sample B0T0B4 (116-B-11), and uranium-238 (GEA) in samples B0T0B0 (116-B-11), B0T0B4 (116-B-11), B0T0D5 (116-B-13), and B0T0H1 (116-B-14)."

If its o.k. w/ Claud, the project staff have would like to see the detection limit findings in the "Minor Deficiencies" section even though there's no qualification. I still have to address these detection limit deficiencies in the Data Quality Assessment.

Inorganics - Data Package W02614-QES:
Please indicate the site number in parenthesis after the sample number, e.g. B0T0D5 (116-B-13) and B0T0H1 (116-B-14).

Please refer comment responses to Rich while I'm out (Sorry Rich, you're the most qualified and the only one I could think of who wouldn't need to "come up to speed" in order to help the Remedial Action Project staff close out these data packages).

Thanks,
Dave

Duncan, Jeanette M

From: Blumenkranz, David B
Sent: Friday, February 19, 1999 2:44 PM
To: Duncan, Jeanette M
Cc: Sturges, Mark H; Fancher, Jonathan D (Jon); Weiss, Richard L
Subject: Comments on Validation Package W02614-QES

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Please indicate the site number in parenthesis after the sample number.
To the "Minor Deficiencies" section, please add "The following analytes and samples had reported MDAs above the TDL/MDA: europium-155 in sample B0T0B4 (116-B-11), and uranium-238 (GEA) in samples B0T0B0 (116-B-11), B0T0B4 (116-B-11), B0T0D5 (116-B-13), and B0T0H1 (116-B-14)."

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Thanks,
Dave

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To: Duncan, Jeanette M

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Thanx,
Dave

Validator comment disposition sent to C Stacey + D Blumenkranz on 2/19/99

for W02606
W02613
W02614
H0324

Duncan, Jeanette M

From: Blumenkranz, David B
Sent: Friday, February 19, 1999 2:06 PM
To: Duncan, Jeanette M

Jeanette,

Responses to my comments (on 2/16/99) on validation packages W02613-QES, W02606-QES, and H0324-RLN are acceptable. If its not a change order or out of scope, please ask the validator if its possible to add the applicable site number in parenthesis after each samples number like, "B0T0F3 (116-B-14)". This would make my life much easier. Hopefully, the validator can accomidate our request. I talked to Jon and we decided tha as long as Rich can review/approve the validation packages for me, the validator can use next week to implement these changes. I'll be looking at validation package W02614-QES will get back to you later today.

Thanx,
Dave

TRANSMISSION RESULT REPORT (FEB 18 '99 02:04PM)

BHI S&D MANAGEMENT 509 372 9487

(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
055	MEMORY TX		3755151	02/02	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION

Jean Marshall
BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: Bruce Christian Fax: 375-5151

From: Jeanette Duncan Date: 2/18

Re: W02614 1R Pages: 2

CC:

☐ Quick Turn · Priority Data ☐ Final Data Package

Jean Marshall
BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: Bruce Christian Fax: 375-5151

From: Jeanette Duncan Date: 2/18

Re: W02614 1R Pages: 2

CC:

❑ Quick Turn Priority Data ❑ Final Data Package

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 2 February 1999

Information Request

W02614 - Radiochemistry

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Is the reported result a detect or a nondetect?

Result is detect,
Sorry for the delay
Rich Mercier 2-18-99

TRANSMISSION RESULT REPORT (FEB 23 '99 03:39PM)

BHI S&D MANAGEMENT 509 372 9487

(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
001	MEMORY TX		3755151	02/02	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION

Duncan, Jeanette M

From: Blumenkranz, David B
Sent: Friday, February 19, 1999 2:44 PM
To: Duncan, Jeanette M
Cc: Sturges, Mark H; Fancher, Jonathan D (Jon); Weiss, Richard L
Subject: Comments on Validation Package W02614-QES

Radiochemistry - Data Package W02614-QES:
Please indicate the site number in parenthesis after the sample number.
To the "Minor Deficiencies" section, please add "The following analytes and samples had reported MDAs above the TPL/MDA: europium-155 in sample B0T0B4 (116-B-11), and uranium-235 (GEA) in samples B0T0B0 (116-B-11), B0T0B4 (116-B-11), B0T0D5 (116-B-13), and B0T0H1 (116-B-14)."

If its o.k. w/ Claud, the project staff have would like to see the detection limit findings in the "Minor Deficiencies" section even though there's no qualification. I still have to address these detection limit deficiencies in the Data Quality Assessment.

Inorganics - Data Package W02614-QES:
Please indicate the site number in parenthesis after the sample number, e.g. B0T0D5 (116-B-13) and B0T0H1 (116-B-14).

Please refer comment responses to Rich while I'm out (Sorry Rich, you're the most qualified and the only one I could think of who wouldn't need to "come up to speed" in order to help the Remedial Action Project staff close out these data packages).

Thanks,
Dave

FAX

TECHLAW, INC.
421 Hills Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 23 February 1999

Information Request

W026I4 - Radiochemistry/Inorganics (re: D. Blumenkrens comments)

I have changed the body of the report to include site numbers after the sample number. Question - does D.B. want the location column on the spreadsheet changed from the sampling area to the site number?

FAX

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Information Request

W02614 - Radiochemistry

The blank analysis for hexchrome (which is in the rad package): The sample result is 0.002, the MDA is 0.002, and their is no U qualifier, thus indicating the result was detected. I would take this to indicate the blank was detected except in several samples (B0T0H0, B0T0D5, B0T0D4, B0T0D3) results reported the same as the MDA are flagged "U".

Is the reported result a detect or a nondetect?